THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1843.] LONDON, SEPTEMBER 6, 1898. [50TH YEAR. PRICE 6d.

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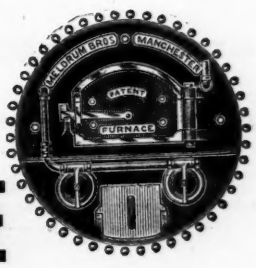

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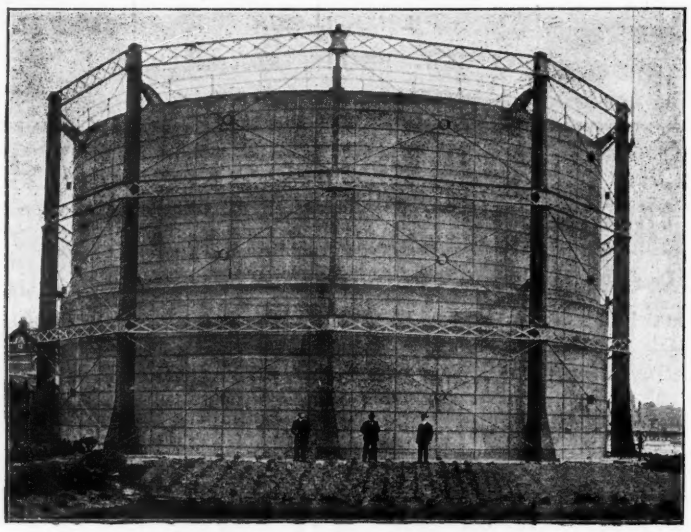

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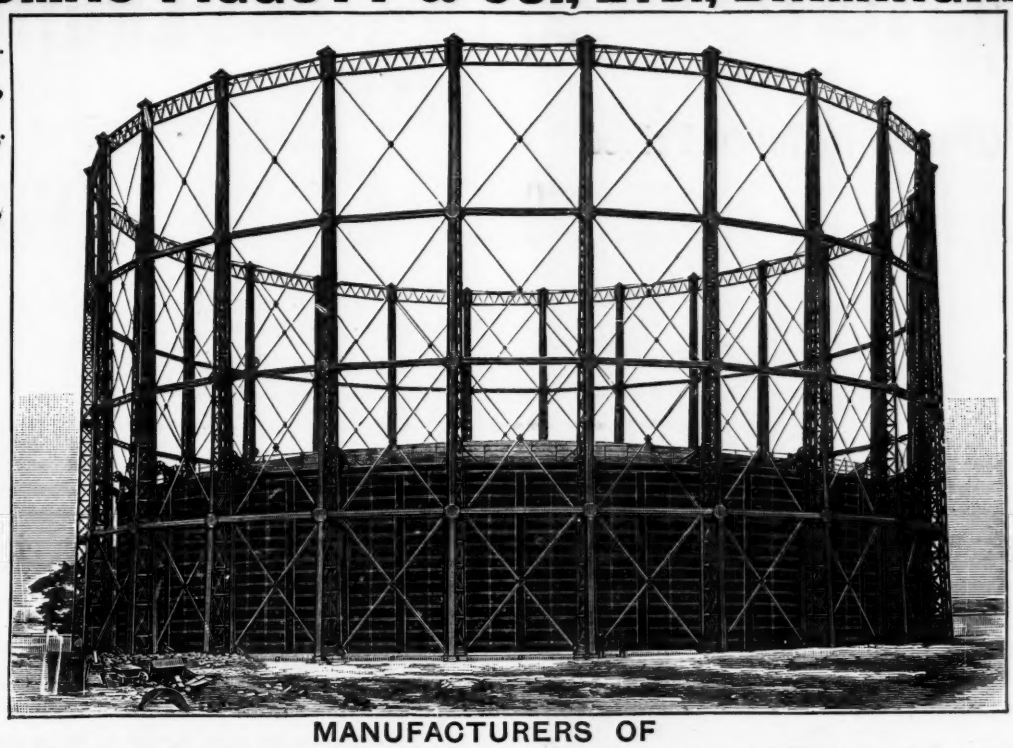

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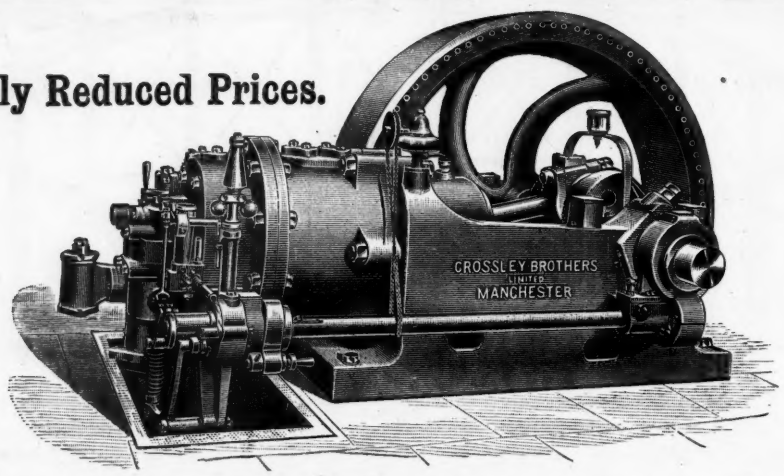

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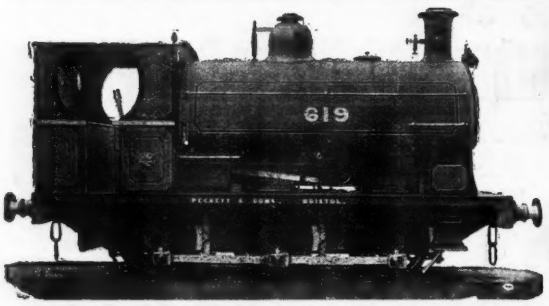

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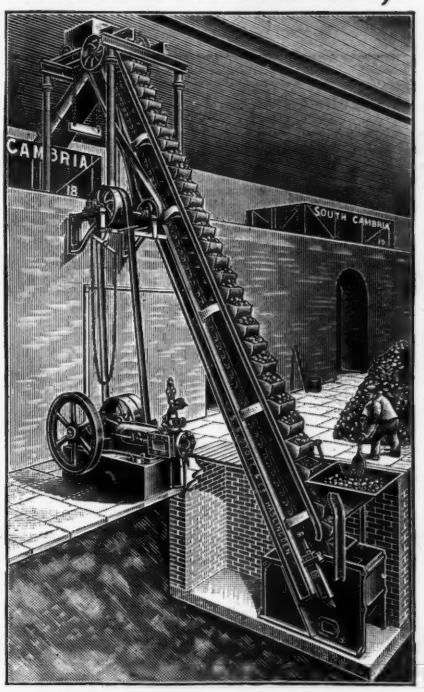

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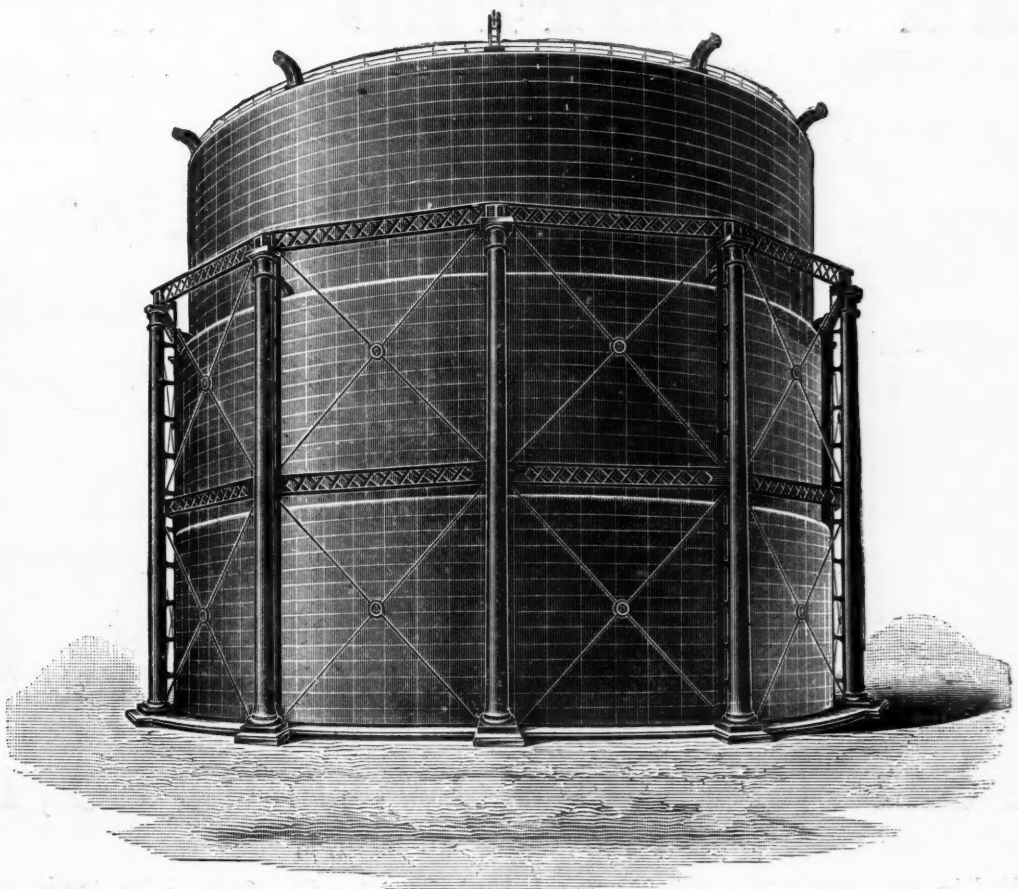

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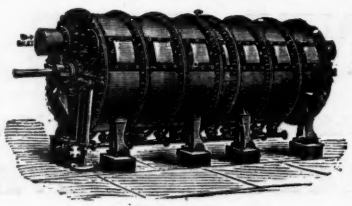

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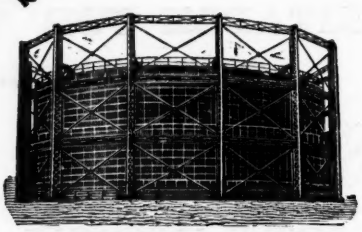

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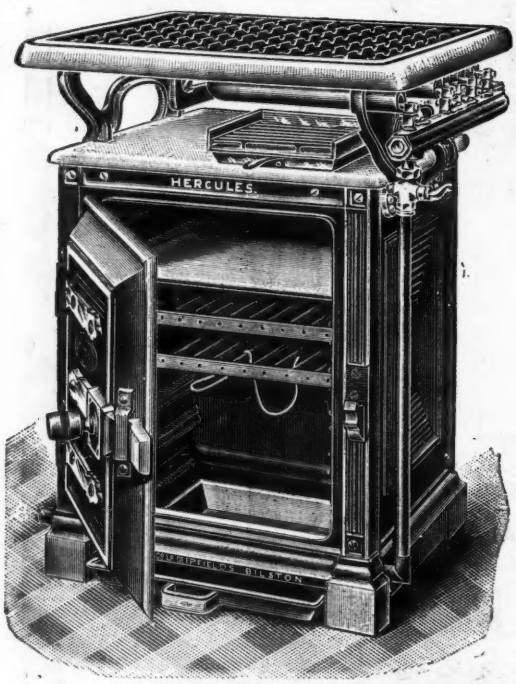

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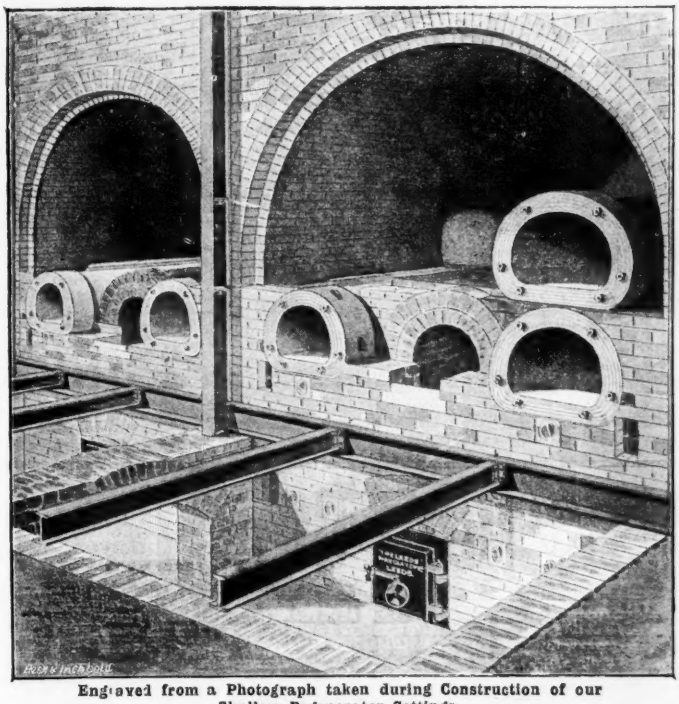

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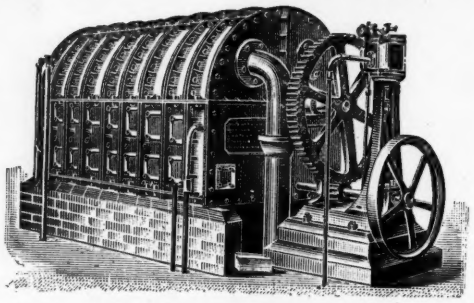

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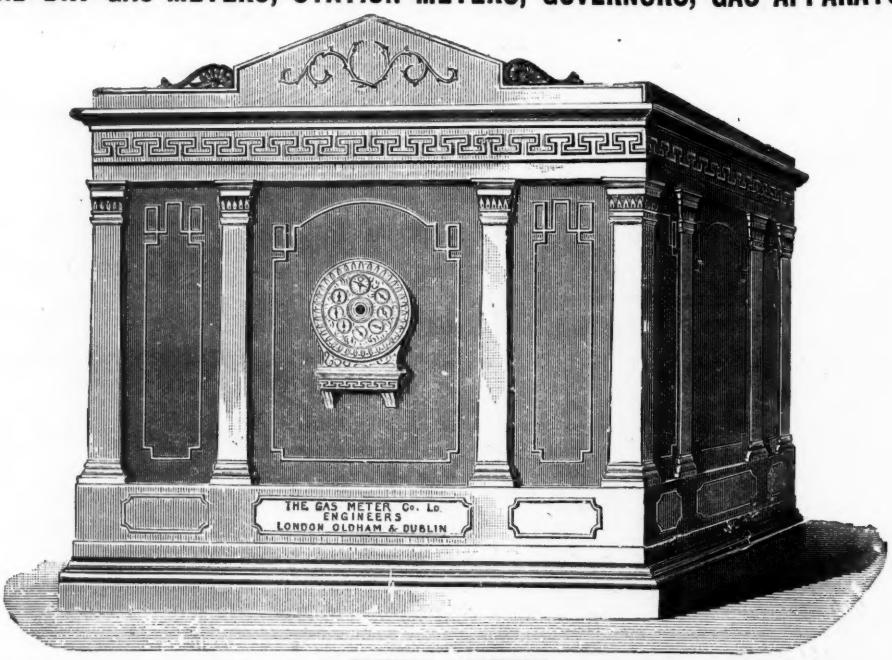

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Liverpool	3,500,000	Commercial Gas Co.	850,000
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Tottenham	750,000	Commercial Gas Co. (Third Contract)	1,250,000
Tottenham (Second Contract)	750,000	Bridlington	125,000
Santiago	400,000	Middlesbrough	1,250,000
Swansea	750,000	Croydon	1,250,000
Manchester	3,000,000	L. & N.W. Railway, Crewe	700,000
Brighton	1,750,000	Taunton	225,000
Preston	1,500,000	Lawrence, Mass.	400,000
New York	1,200,000	Rotterdam	850,000
Southport	750,000	Dorking	125,000
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Newburgh, N.Y.	350,000	The Gaslight and Coke Co., Bromley	3,750,000
Newburgh, N.Y. (Second Contract)	250,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Hoylake	125,000	Durham	200,000
Coventry	600,000	New York (Remodelled)	11,000,000
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Bordentown, N.J.	125,000	Perth, W.A.	125,000
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Shanghai	225,000	Maidenhead	225,000
Stockport	500,000	Epsom	225,000
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Lea Bridge	350,000	Falmouth	150,000
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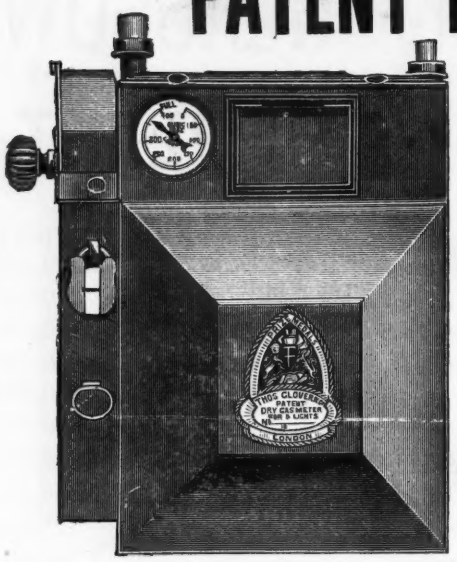

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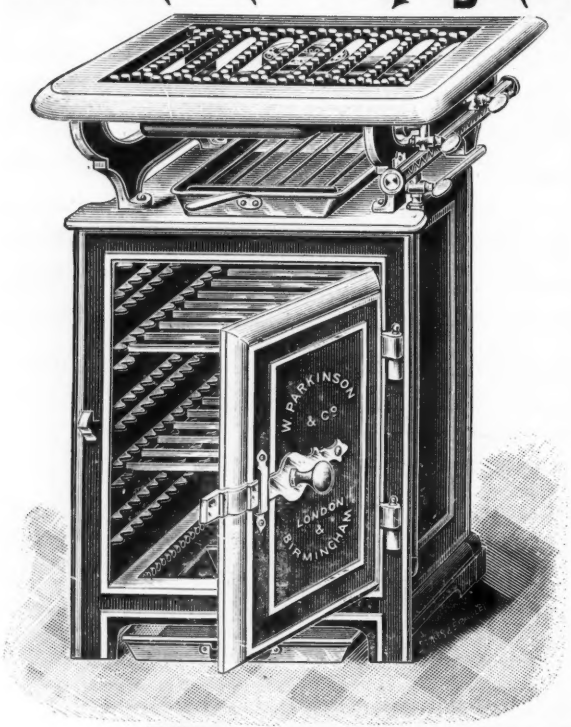

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EDITORIAL NOTES.

The Trade Union Congress.

THE Trade Union Congress held at Bristol last week was characterized by the ordinary elements of such assemblies. Much as the rest of the public would like to take these "Parliaments of Labour" seriously, it is difficult to do so in view of the nonsensical nature of a large part of the usual proceedings. The business of the congress began with a performance by the Parliamentary Committee, consisting of the passing of a resolution "deprecating" the action of the Judge and Jury at the last Glamorgan Assizes, in sending a strike leader to prison for "alleged intimida-"tion." The congress might as usefully have "deprecated" the spring tides of the Severn. The report of the Parliamentary Committee was the customary hotch-potch of Party politics and Trade Union principles. It was admitted to be impossible to "boast of the successful "passing of any prominent legislative measure directly "promoted by the congress;" one reason for this failure being, probably, that the congress is not in the habit of promoting schemes of legislation of a character that Parliament can ever accept. The report goes on to declare that "it must be obvious to everyone who has watched the "proceedings of Parliament during the last two or three "years, that it is useless to expect any active measures of "industrial reform from the House of Commons." And this of a Parliament that has passed the Workmen's Compensation Act, and given much labour to the preparation and passing of other measures, chiefly in the interest of the poorer classes! The address of the President of the congress, Mr. J. O'Grady—a local Trade Unionist—was a long and laboured composition, containing, however, a few pointed remarks. Commenting upon one of the subjects respecting which the congress is continually passing resolutions, the President asked: "What is the "good of these heroic resolutions, if there is no intention "of carrying them into effect?" What, indeed! But this question strikes at the root of such functions as the congress itself. When speaking of the Workmen's Compensation Act, the President showed that he had not taken counsel with the Parliamentary Committee in preparing this part of his address, because he called it "one of the "most revolutionary of the laws relating to labour that "the century has yet given birth to." Mr. O'Grady's remarks upon the Act were among the most interesting passages of his address; he being the first representative working man, not belonging to the stock company of labour leaders, to state in public his opinion of the law. He looks at the probable effect of the Act upon trades dangerous to life and limb, and takes the broad view that far too many workpeople are killed and injured in British factories. Unless these trade accidents can be prevented, the Act will be a costly affair for some employers—and a good job too, says Mr. O'Grady, who is for making such accidents too dear for employers to permit them, and for securing adequate compensation for those that cannot be prevented. Of course, as a Trade Unionist, the President condemned the Act for permitting contracting out. But, taking it as a whole, he thought that in it workmen have something to rejoice over, and that they should be prepared to give the Act a fair and impartial trial. This is certainly good sense.

In his comments upon the engineers' strike, the President allows the public to get a peep into that remarkable organ, the mind of a working man who is before all things a Trade Unionist. He admits the failure of the engineers' strike; but the first lesson he learns from it is that of the "absolute futility of attempting to gain any considerable "reduction in the hours of labour by Trade Union action "alone." Mr. W. Thorne could have told him something about that. It is admitted that the employers in the engineering trade beat the men by the superior use of their own weapon—organization. Therefore, Mr. O'Grady thinks, there is nothing else for the men to do but organize still more highly. The time is ripe for the federation of all trades! This, we are told, brings us within measurable distance of Collectivism; when we learn, without surprise, that such is the end of Trade Unionism. So, by an easy and pleasant round, the President brings his audience to the point from which he and most of them started. For, of course, they were Collectivists all along. "Having "agreed, then, that the objective of Trade Unionism is

"Collectivism, as the only possible outcome of a long "series of its own actions, as the only logical expres- "sion of the trend of modern industry, and the cer- "tainty that it implies the only solution of the social "problems that face us to-day, as practical men we "must use every agency at hand, industrial and political, "to work consciously towards that goal." So the Snark is a Boojum after all! Employers generally will take note of this official identification—not for the first time—of Trade Unionism with Collectivism; and when next they are confronted with a Trade Union demand, they will know what is behind it. One of the local newspapers has been startled at what it has learnt from the President and the congress as to the aims of Trade Unionists. It remarks: "They do not seem to care anything for freedom of dealing "between man and man, for the cheapness of articles of "consumption which must come from the encouragement "of foreign imports, for the increased burden of general "taxation which would certainly come if the State as an "employer of labour were to consider only, as it would be "expected to do, the wages paid to workmen, nor for any- "thing at all but the realization of an idle, selfish, mis- "chievous dream." This is the sober truth.

End of the South Wales Strike.

EVENTS moved swiftly during the past week towards the termination of the South Wales strike upon the lines laid down by the employers from the beginning. The outlook in South Wales began to brighten just when matters seemed to be at their very worst. We gave last week the heads of the new terms of settlement that emerged from the joint conference held on Saturday week. The men's leaders—who, by the way, ill deserve the name—had abandoned all the high-sounding principles for which they were supposed to be contending, and retained only the demand for the recognition of a minimum wage, which the employers once more rejected. The whole business might have been settled on the Saturday, but for the reluctance of the men's representatives to take the responsibility for giving up their cause. As it was, the men were allowed until Thursday to make up their minds. They agreed to accept the masters' terms; and, accordingly, the strike is at an end. It is hardly necessary to remark that it should never have been begun; for a more aimless, foolish revolt of men against the conditions of their employment is not recorded in the history of human industry. It will be some time before coal from the stopped pits comes again to market. The colliers and all those who are directly or indirectly dependent upon them have suffered terribly, and all in vain, as well-informed onlookers predicted from the first would be the case. The coalowners have also lost heavily in money; but they have gained in repute for consistency, wisdom, and loyalty to their principles. Best of all, they have shown themselves to be masters of their own business. Like the engineering employers, they have justified themselves upon every point of their combined action.

It is impossible to overestimate the value of this complete discomfiture of the powers of industrial anarchy which have dominated South Wales since April last. Nothing is lacking to the proof thus given that sound economic principles, inspiring united action, persevered in for a sufficiently long period, are bound to win against all the forces that sentimentalism, time-serving politics, and economic heresy can marshal against them. Coming after Bethesda, the engineers' *fiasco*, and the firm stand of the Admiralty against Trade Union arrogance in the dock-yards, this South Wales defeat should help to convince the ordinary workman—and even the hack politician and the popularity-hunting newspaper—that a strike has become a game for two to play. Even the delegates at the Trade Union Conference must have realized the truth that their performance is only a modern kind of puppet show, when on the morrow of their passing a bombastic resolution expressing "deep sympathy with the Welsh "miners in their prolonged struggle," and condemning the "arbitrary attitude taken up by the colliery proprietors," these same miners agree by an overwhelming majority to accept the employers' terms. Not one jot or tittle of the employers' case was relinquished in this settlement. The workmen's representatives tried at the last to save the monthly holiday instituted by the men some years ago, and styled "Mabon's day." But the employers stood firmly for the abolition of what has proved to be a demoralizing and wasteful suspension of work; and it has gone the way of the independent umpire, the minimum wage, the reduction of output, the demand for a big advance, and all the other sacred and necessary points of the strikers' charter. Of course "this congress" could easily express "deep "sympathy," but could not affect the settlement one iota. Trade Unionist resolutions of this character are kept "in "blank," so to speak, and the spaces filled in with the names of the strikers who happen to be making the "noble effort," and the employers whose "arbitrary" conduct is to be condemned. The thanks of the community are due to Sir William Thomas Lewis and his colleagues for their wise and courageous action in meeting the grave emergency created by the men's revolt. The employers did not court the conflict; but when it was forced upon them, they showed that they meant to win, and they have done so "all along the line."

The Board of Trade Report on the Gas Orders for the Year.

THE Board of Trade report on their proceedings for last session under the Gas and Water Works Facilities Act has been issued. It recounts that all the Gas Orders applied for were granted, except two—Churwell and Freshwater. In the former case, the undertaking was already in existence without parliamentary authority; and in the latter, the application was for permission to construct and maintain new gas-works. The Churwell application was withdrawn by the promoters in consequence of their having agreed to sell the undertaking to the Morley Corporation, who had a Bill in Parliament for this and for various other purposes. The Freshwater Order failed through the opposition of the Local Authorities. Coatbridge and Slough asked for and obtained the sliding-scale. In six other cases the Board of Trade fixed a maximum selling price, reserving power to alter the maximum or substitute for it a sliding-scale after three years. The usual minimum of 15 candles for the illuminating power of the gas to be supplied was varied in two instances. Crossgates is to have 16 candles; and Cannock, 14 candles. The latter decision is interesting as showing the regard paid by the Department to local conditions. The Cannock Order is of a special character in other respects, owing to an agreement having been arrived at between the Company and the Local Authorities concerned. These provisions relate to the limitation of dividend on the original capital to 7 per cent.; the sale of mortgages by auction or tender; the prescription of a higher minimum pressure and a lower illuminating power than usual; and the sale of the undertaking in special circumstances. Clauses were inserted in the Budleigh Salterton and the Crossgates, Halton, and Seacroft Orders as to the supply of gas for public lighting; in the Cannock and Crossgates Orders, for the protection of mineral rights; and in the Budleigh Salterton and Cannock Orders, as to the breaking up and repair of streets. This is the whole story of the dealings of the Department with the Orders submitted for inquiry and sanction; and, as usual, the discretionary powers vested in the Board appear to have been exercised with judgment and intelligent appreciation of local needs.

The History of the Gas Supply of Birmingham.

JUDGING by an extract from the "Birmingham Daily "Post" which will be found in another column, it has just been remembered in the Midland Capital that gas lighting is now a hundred years old, and that Murdoch, the inventor of this particular application of coal, was for some time of his useful life a local worthy. It is interesting to note that, although gas lighting on a considerable scale was actually first tried and made successful in Birmingham, the organization of the industry as a public undertaking was not effected there, but in London. The reason for this was that Murdoch and those who were associated with him in this enterprise regarded it as a trade speciality of their own. There is other evidence to show that Boulton and Watt—Murdoch's partners—were in some respects narrow-minded, not to say selfish and grasping in their business methods. At any rate, they did not see the potentiality of development as a public service which was undoubtedly inherent in Murdoch's invention; but Winsor, the unpractical man of ideas, did see it, and became the true father of gas undertakings as they exist to-day. It is significant of the fact and the persistence in Birmingham of Murdoch's way of treating gas, that the first public works for the supply of the new illuminant were laid down by a private trader. Eventually two Gas Companies

came into existence in Birmingham and the surrounding district. It is almost ancient history how these two undertakings became municipalized, and how one of the chief products of the operation was the Right Hon. Joseph Chamberlain, who made the conversion the stepping-stone for his own elevation from the condition of a provincial politician into the grade of a statesman. As the tale of the progress of the old Companies is told by our Birmingham contemporary, it comes out clearly that the gas consumers of the district fared quite as well under the old *régime* as they have done in the new. "As years rolled by, the scale "was frequently revised, invariably in favour of the con- "sumer. . . . In 1873, the price was 2s. 7d. for a "consumption of 25,000 cubic feet and under, and 2s. 3d. "where the consumption reached 100,000 cubic feet." These are the prices ruling to-day, although the output of gas has more than doubled. Of course, somebody has benefited by the process of municipalization. Birmingham is a handsome city now, compared with the higgledy-piggledy town it was a quarter of a century ago. The gas consumer has paid for a good deal of this improvement; "betterment" in the old sense has done the rest. But when the advantages of the municipalization of the gas supply in the case of Birmingham are cited, as is frequently done, let it not be overlooked that the obsolete old Gas Companies did just as well for their customers as the grand new City Corporation does to-day.

The British Association at Bristol.

THE regrettable destruction of the Colston Hall, Bristol, by fire last week will in all probability affect but little the prospects of this year's meeting of the British Association, which opens in the city to-morrow. One can only rejoice, if it was fated that the celebrated hall should be destroyed by fire about this time, that the catastrophe occurred during the holding in it of the Trade Union Congress instead of the following gathering; for it is quite possible to bear with equanimity the intelligence that all the archives of the Trade Union Congress "went up" in the flames last Thursday. Nobody is likely to be one penny the worse for the disappearance of the minutes of this egregious assembly; but if it had been the papers of the British Association that had been thus sacrificed, the loss might have been serious. The day has passed when the British Association meeting was looked to as the occasion when the particular gain of science for the year would be introduced to the world. We cannot nowadays wait for this yearly function, when science has found something new in the borderland between the known and the unknown, where its pioneers work. Art is long, and time is fleeting; and the instant a fresh discovery is made, it is published, in order that busy hands and brains all the world over may test and try what can be made of it in the cause of the advancement of knowledge and for the benefit of mankind. The President of the Association this year is Sir William Crookes, one of the most distinguished and enterprising of English chemists. It is reported that the presidential address will deal with the world's wheat supply, in connection with the fixation in the soil of atmospheric nitrogen, and the philosophy of manuring. It is appropriate that this year's President should be a chemist and physicist; for much that represents the latest progress of science lies in the domain of these important branches of study. Professor Crookes will accordingly have to deal with such important subjects as the liquefaction of hydrogen; the constitution of matter at the absolute zero of temperature; the newly-discovered gaseous elements; Röntgen ray developments; "the fourth "state of matter;" and so on. It is expected that in the Chemistry Section Professor Ramsay and Dr. Morris Travers will introduce their new discovery "Neon" to the world which has so long actually breathed it without being aware of the fact. In the Economic Science and Statistics Section, the President, Dr. J. Bonar, will deal in his address with "Old Lights and New in Economic Study"—a most suggestive title. Mr. A. L. Bowley is to read a paper on "Wages;" and papers are promised on "Labour Co- "partnership," "Municipal Enterprise," and "Electrical "Enterprise and Municipalities." Some interesting subjects will be dealt with in the Mechanical Science Section, which will be presided over by Sir John Wolfe-Barry. The influence of earth currents upon the corrosion of gas and water pipes will be discussed in this section by Professor Fleming. Altogether, the programme of the meeting is of a very high character.

WATER AND SANITARY AFFAIRS.

MAJOR-GENERAL SCOTT appears to have been pressing upon the attention of the Local Government Board the scheme for connecting the Grand Junction system with that of the New River Company, so as to enable the latter to render greater assistance to the East London Company. This so far agrees with our remark of last week that if General Scott knew of any engineering device that could bring a further supply of water into the East London district, he would give the Company and the consumers the benefit of that knowledge. That we have not under-rated the difficulties of any such an enterprise is shown by the circumstance that the execution of this plan is estimated as likely to occupy "some months." We should presume that General Scott reckons on more rapid progress; for in the communication addressed by the Board to the East London Directors, the latter are urged to carry out the scheme "at the earliest possible moment," with a view to the increase of the supply which is "urgently required." If indeed the work can be done so quickly as to meet the present want, it comes as a most unexpected and welcome relief. But there is another project, already in hand, and rapidly proceeding, which offers a more speedy result. In this remarkable scheme—by which a supply is to be brought into the East London Company's district from the works of the Southwark and Vauxhall Company—we seem to meet with a justification of the remark attributed to Mr. Bryan, that the East London Company were under the necessity of going "further afield." It looks like a stroke of genius to devise a scheme for drawing five million gallons per day from the Southwark and Vauxhall works through the Tower Subway into East London. Two miles of 20-inch pipe are required to establish the connection; and deep shafts have to be constructed at the extremities of the tunnel. But the contractors are doing everything short of the miraculous in order to effect the connection in time to relieve the drought.

The energy displayed by the East London Company in coping with the difficulties by which they are now beset, deserves a better reward than the virulent and unreasonable attacks by which they are being perpetually assailed. Doubtless Mr. Bryan and his colleagues, together with his Board of Directors, are too busy in devising and carrying out measures in aid of the supply to pay much heed to what is either written or spoken to their detriment. Help is now obtained from the New River Company to the extent of six million gallons of water per day in place of four millions. The pipes of the Kent Company in the Blackwall Tunnel furnish half a million gallons. The Thames is supposed to yield its ten million gallons, though there is a report that the quantity actually pumped has to be somewhat less, in order to avoid bursting the pipes. But the Lea is running so low that the reservoirs of the East London Water Company are fast giving out more than they receive; and the prospect is full of anxiety. On Saturday a further restriction of the supply took place, and was clearly inevitable; the water being turned on daily for two periods of two hours, in place of two periods of three hours. Still the cruel waste goes on, water flooding the sewers from house-taps perversely left open, although the Local Government Board have addressed a circular to the Sanitary Authorities of East London, asking them to assist as far as possible in impressing upon the water consumers the urgent necessity of avoiding all waste of water under the circumstances which now exist in the district. It is easy, in the present critical state of affairs, to blame the Water Company, and accuse the Directors of want of foresight. But what foresight were they to exercise? The case would be infinitely worse if they had not, in defiance of the County Council, and in the face of much discouragement in Parliament, carried their Bill in the session of 1894. It is true that the works then authorized were insufficient, and they had to seek further powers in a subsequent session. These latter works, for which the Act allows seven years, are to be completed in three years from the present time. But supposing the two schemes had been welded into one, and had been laid before Parliament in 1894, it may be safely averred that the Bill would either have been rejected or the scheme cut down. The Company have proposed more, and have done more, than the County Council approved. Yet the Directors are held responsible for the present deficiency in the supply. If the

County Council had prevailed in 1894 as they did in 1893, it is perfectly certain that East London would now be suffering a veritable water famine. That the consumers have a supply for four hours per day instead of one hour, is something for which they are indebted to the Company and not to the Council. As for the existence of a drought, the statistics of the rainfall and the experience of other towns abundantly prove its reality.

It is recorded in our news columns that the Directors of the Maidstone Water Company have instructed their Manager to carry out a daily examination of the springs which furnish the local supply. There is also to be a rigid supervision of the springs, night and day, so long as the hop-pickers are in the neighbourhood. This may be taken in relation to the remarks contained in the recent report by the Local Government Board Inspectors as to how far the regulations of the Board in reference to the duties of Medical Officers of Health, and the statutes which regulate the powers and obligations of private Water Companies, are sufficient to ensure a reasonable amount of protection to the public health. It will be seen that in this case the officials of the Maidstone Company exercise supervision over the supply, and we hear nothing of the Medical Officer of Health. There is, indeed, a question as to the power of such an officer to inspect the works of a private Company. This difficulty arises especially where the works are situated outside the Medical Officer's district. The Maidstone authorities were unquestionably lax with respect to the drainage of their borough; and their care of the water supply seems to have been fatally perfunctory. Thus we are told in the official report that, while the Directors of the Water Company relied on the quarterly reports made by Mr. M. A. Adams, "there was never any systematic inspection of the works "from a sanitary point of view." The Town Council and the Company are both blamed; but the question of authority still remains to be settled. Had anybody examined the surroundings of the Farleigh springs, it would have been seen that they were "obviously and "abominably filthy." But nobody looked, and nothing was known. The zeal of Mr. Adams in the performance of his duties is placed beyond question; but, as a matter of fact, he never so much as saw the sources of the supply furnished to the Farleigh area. It has been argued in the London County Council that what happened to Maidstone in the visitation of typhoid fever, might happen to London. But the cases are in no respect parallel. We believe General Scott has no legal right to visit the works of the London Water Companies; but he is never denied such access. With respect to the quality of the London Water Supply, there are the analyses furnished to the Local Government Board by Sir E. Frankland, as well as the daily examinations furnished to General Scott by Sir W. Crookes and Professor Dewar. The law may be defective; but very much depends on the view taken of their powers and responsibilities by the authorities concerned. It is very possible that the regulations of the Local Government Board with respect to the inspection of the water supply will undergo some amendment, and perhaps even a change made in the statutory regulations.

The Forthcoming Meeting of the Institution of Gas Engineers.—We learn from the Secretary of the Institution (Mr. Thos. Cole) that the autumn meeting will be held in Manchester on the 29th and 30th inst. The arrangements have not yet been completed; but we understand that the first day will be devoted to visiting the gas-works of the Corporation, under the guidance of the President (Mr. G. E. Stevenson, M.Inst.C.E.), their Consulting Engineer, and other places of interest in the city, and on the second the members will in all probability have an excursion to Windermere.

Eastern Counties Gas Managers' Association.—The next meeting of this Association will be held in the Council Room, Romford, on the 15th inst., under the presidency of Mr. W. D. Child, the Engineer and Manager of the Romford Gas Company. According to the programme issued by the Hon. Secretary and Treasurer (Mr. J. H. Troughton, of Newmarket), the members will assemble at the gas-works shortly after noon, and partake of light luncheon courteously provided by the Directors of the Gas Company. They will then, under the President's guidance, inspect the gas-works, and proceed to the Council Room for the transaction of the business. Two new members will be proposed for election; and after the delivery of the President's Inaugural Address, Mr. Harry Wimhurst, of Sleaford, will read a paper on the "Workmen's Compensation Act, 1897." There will be a short drive in the afternoon, and the usual dinner on the return.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 545.)

BUSINESS was decidedly more brisk on the Stock Exchange last week, thanks to a succession of mild excitements. First came the Tsar's circular, which, though little practical result in the direct line was expected from it, was regarded as operating in favour of peace. Then the report of an arrangement in Delagoa Bay was a welcome item; and this was capped by the actual settlement of the Welsh coal strike. So prices profited accordingly. Things in general would indeed have been better still, had it not been account week with a closed Saturday at the end of it, which disposed operators to postpone extensive dealings until the re-opening. The Money Market was much firmer. There was a very brisk demand for accommodation from the Stock Exchange; and discount rates hardened under the United States requirements of gold. But in the Gas Market none of the influences which were swaying other departments prevailed to galvanize it into activity; and a quieter week on the whole it would be difficult to find, though there was a little more life in it on the closing day. In Gaslights, a few dealings took place at about 293, until Thursday, when some stock was let go at 291½; and the quotation was pushed down a couple of points. But it rallied on Friday, and fully commanded the old price, though the quotation was left standing. The secured issues were very quiet but strong; and the "H" advanced in value. South Metropolitan was extremely quiet, and made no sign. The same may be said of Commercials. The Suburban and Provincial Companies were as inactive as usual. Several of them were quoted *ex div.* on Wednesday, and gained more or less by the operation; the only exception being Tottenham "B," which (perhaps inadvertently) was put too low. The Continental undertakings were firm generally. Imperial advanced, and Union and European were steady; but Tuscan had a fall. Among the rest, Oriental proceeded with its recovery from artificial depression; and Bombay and River Plate debenture advanced. The Water Companies were as nearly stagnant as they could be. New River was slightly better; and East London a little worse.

The daily operations were: Next to nothing on Monday; but the tendency was all in favour of improvement. Gaslight "H" and Imperial rose 2 each; River Plate debenture, 1; and Oriental, £1 paid, ¼. Tuesday was just as quiet; and the only move was a fall of 1 in Tuscan. Transactions continued on Wednesday to stand at the nearest point to absolute inaction. Oriental old and new rose ¼ each. Thursday's business was as limited as on any other day. Gaslight "A" receded 2. East London Water also fell 2. On Friday, there was more doing, and prices were better. Bombay and Oriental £1 paid rose ¼ each. In Water, New River rose 2. On Saturday, the Exchange was closed.

THE REPORT OF THE PETROLEUM COMMITTEE.

SECOND NOTICE.

WE broke off the last notice of the Petroleum Report at the interesting point where the Committee pass from considering the transport, storage, and sale of petroleum to its use for illuminating purposes. The first thing to be dealt with under this head is the flashing-point of petroleum intended to be burnt in lamps, It is obvious that a number of considerations arise in connection with this aspect of the flash-point. We certainly cannot compliment the Committee upon the manner in which their report approaches this division of the inquiry. The matter is most awkwardly arranged, inasmuch as the report discusses the probable effects of "prohibiting by law the sale or use of petroleum below a certain high flash-point for illuminating purposes," before considering what the term flash-point really signifies in this connection. The effect of this mal-arrangement is most unfortunate, as lending colour to the case, sedulously set up by that section of the oil-trade interest which has a high-flashing oil to sell, that the flash-point is everything, and that nothing else—chemical composition, construction of the lamp, or what not—matters to the question of whether a mineral oil is a safe lamp oil or not. It will be helpful to place the real question upon a clearer, more logical basis than the rambling statement offered by the Committee.

Petroleum, then, is the name of a liquid composed of a variety of fluid hydrocarbons, which may be present in any sample in different proportions, and render it more suitable for use for some purposes than for others. All petroleum possesses the quality of volatility in the open air. It evaporates, as iron rusts, at different rates under different conditions. It is inflammable, and its vapour is also inflammable. And we know that when an inflammable substance becomes intermingled with air in certain proportions, it constitutes an explosive mixture. All petroleum being volatile—some samples more so, or rather more rapidly so at ordinary temperatures than others—it becomes a question of that universal science which is only systematized common sense to know how to distinguish the degrees of this quality, with regard to the consideration of public safety from

the realization of its undesirable potentialities of accidental ignition and explosion. How shall we agree upon what is a safe petroleum with reference to its degree or rate of volatility at ordinary temperatures? If a sample gives off its vapour so rapidly at temperatures which are attained by our atmosphere that the vapour will "flash," or ignite, at an open flame, under such conditions, it is evidently an article requiring careful handling. It means that if such a petroleum is exposed to such a temperature in any locality which is so enclosed that the vapour cannot freely escape as fast as it comes off, it is only a question of time for the atmosphere so confined to become explosive. The rate of evaporation being proportionate to the temperature, the lower the flashing-point the more dangerous the petroleum for keeping or using at ordinary atmospheric temperatures.

The flash-point has nothing to do with the composition of the oil, or anything besides its volatility at the stated temperature. When the value of this simple physical characteristic of the volatile petroleum was first recognized, it was decided that, since an atmospheric temperature of 100° Fahr. is never reached in this country, petroleum which did not evaporate so rapidly at this convenient figure on the thermometric scale that the vapour would ignite at an open flame, might be regarded as practically safe to store and handle. There was no word about its burning qualities in this classification. The law which formulated the flash-point was not concerned with the use to which the petroleum to which it applied might be put. All it said was that petroleum which flashed at the stated point was petroleum within the meaning of the Act. As time went on, and experience of the trade was gained, it became apparent that the method of testing the flash-point—by heating the petroleum to the required temperature in an open cup—was defective. An improved apparatus for testing was devised by the same expert—Sir Frederick Abel—who translated the original unreliable 100° "open" test into 73° "close" test. The alteration was solely a matter of the instrument; but what a pother has been raised over it by interested advocacy working upon ignorance!

As the flash-point had nothing to do with the composition of the petroleum, neither had it any relation to the suitability of petroleum for burning in lamps. The utilization of mineral oil—in the first place, the so-called "paraffin oil"—for this purpose was independent of the flash-point. The problem was to make a lamp to burn the new kind of oil; and this problem was solved only too completely, for the market was eventually flooded with lamps, selling at a penny apiece, that would do it easily. From the commencement of this trade, however, it became apparent that mineral oil, by reason of its volatility, could never be ranked for safety with the old-fashioned vegetable and animal oils. Nothing was said in the trade about the flash-point as indicative of the dangerous quality of a burning oil, until the paraffin oils manufactured from shale were beaten in price by American kerosene. Then there was trouble; and the paraffin oil interest, seeking a weapon other than price to attack the foreign intruder, fastened upon the flash-point, which happened to be lower in the case of the latter commodity. How successful the *ruse* has been in enlisting a certain amount of fervid, if vague, public sentiment in its favour, is shown by very many evidences; but principally, for our present purpose, by the circumstance that the Petroleum Committee have agreed by the narrowest majority to recommend the raising of the dividing line between petroleum spirit and petroleum oil to the flash-point of 100° Abel close test.

It is easy to exaggerate the importance of this victory, such as it is. It does not advance the solution of the problem of rendering the oil burnt in mineral oil lamps safe, in the same sense as vegetable or animal oil is safe—that is, incapable of giving off an inflammable vapour, or of communicating fire without the aid of something analogous to a wick. Reverting to the reasons assigned for the adoption of the flash-point as an indication of the practical safety of mineral oil for transport, storage, and handling, it is to be remembered that the principle underlying the selection of the critical temperature was that the commodity could never be exposed to such a temperature by natural agency. It is clear, therefore, that if for the operation of natural agency the action of the incidental heat of combustion of a lamp is to be substituted as giving the temperature of equal safety in the use of the oil for burning, what is needed is to substitute the maximum temperature attainable by a burning lamp for that of the atmosphere in the previous case. But this logical conclusion is just what nobody was able to advise the Committee to accept. What flash-point would render a mineral lamp oil absolutely safe, as colza or sperm oil are safe? The somewhat startling reply is *infinity*.

If we use a suitable lamp, naphtha, benzoline, anything in the way of petroleum spirit down to pentane—which evaporates so quickly that drops poured out of a bottle in a man's hand never reach the floor—can be burnt as safely as the stuff used in "Lucigen" or Wells lights. In order to place the question of safety of the oil upon an intelligible basis, it is necessary to postulate the kind of lamp meant to be used to burn it. This was permitted to be understood by the Petroleum Committee. There is the excuse for this looseness of treatment of the question, that everybody knows what is meant by a petroleum lamp. Assuming this knowledge, the next question is as to the conditions necessary to be observed in using such lamps, so as to ensure a condition of absolute safety. Here the inquirer is again brought face to face with the infinite. It seems to have been accepted implicitly by the Committee, upon the admissions of their witnesses, that to require the raising of the flash-point of mineral oil above the temperature existing at any time in the lamp reservoir was impracticable. Yet this admission yields the whole case for high-flashing oil, as a certain guarantee of safety, and falls back into the region of opinion on the question of degree.

The report contains ample proof of the emptiness of this question, treated as one of degree. Let it be clearly understood that petroleum can be had of any flash-point, from nothing up to 528°, or thereabouts; the latter being cylinder lubricating oil. Taking petroleum lamps as they are, Professor Dewar opines that if absolute safety is to be sought by way of the flash-point, this must not be lower than 212°. Lord Kelvin is less exacting; being of opinion that 120° would be a high enough flash-point. Mr. Spencer, of the London County Council, would like to see the flash-point at 120°; but, in view of the awkward fact that a sufficient supply of such a lamp oil could not be had, he would be content with 100°. Lastly, the Lamp and Stove Makers' Association fancied that accidents with lamps would be less frequent if the use of oil for domestic purposes at a lower flash-point than 100° were prohibited. Naturally, the Scottish contingent favoured a flash-point more convenient to themselves than to their trade rivals. The important consideration to be borne in mind with regard to this part of the case is that the presumed advantage of raising the flash-point from 73° to 100° (Abel close test) is purely a matter of opinion, as the supposed improvement of the oil is one of degree—and a small degree—as compared with the lowest named point of complete safety.

Now for the other side, which is concerned to prove "that the flash-point does not indicate the real safety of the oil; that safety depends on the chemical constituents of the oil; that in some high-flash oils the heating properties are so great as to send up the temperature very rapidly, and that they are consequently not safer than, if so safe as, low-flash oils which heat less quickly."

PERSONAL.

Mr. F. CHAMBERS, the Manager of the gas-works at Uckfield, has obtained a similar position at Dunbar, N.B.

Mr. Alexander Aitken having resigned the secretaryship of the Stranraer Gas Company, it has been conferred on Mr. W. G. BELFORD.

Mr. H. POHMER, an Assistant-Engineer on the works of the Imperial Continental Gas Association at Hanover, has been awarded the second prize of 5000 marks in the competition instituted by the authorities of the town of Königsberg for the plans of the new gas-works to be erected by them.

Mr. T. LANCASTER, the foreman at the Colne Gas-Works, has recently secured, out of 46 applications, a similar appointment at the Cambridge Gas-Works. Previous to commencing his new duties, the workmen subscribed for a beautiful timepiece, which was presented to him on Monday last week by the chief meter inspector, Mr. W. Boothman, who complimented him on the progress he had made in his profession during the past three years. Mr. Lancaster briefly thanked the men for their gift.

The eminent services of Colonel S. A. SADLER to Middlesbrough have been repeatedly recognized by the Corporation and the community, but never before in such a handsome and generous manner as on Tuesday last. The regard in which he is held was amply demonstrated when, although he had previously filled the office, he was chosen for the mayoralty during the Jubilee Year. The manner, however, in which Colonel and Mrs. Sadler performed the duties which crowded upon them in that exceptionally busy year, deserved more than ordinary praise; and a Committee was formed to consider the best course to adopt to fitly recognize their labours. It was decided that a portrait of Colonel Sadler should be painted by Mr. F. Bramley, A.R.A., and placed at the disposal of the former, and also that a magnificent tiara of diamonds should be presented to Mrs. Sadler. The decision of the Committee met with hearty approval; and the subscriptions which were sent in amounted to more than £750. The interesting function of presenting the gifts was performed, at the Town Hall on Tuesday, by Sir Lowthian Bell, in the presence of a large and distinguished company, whose enthusiasm must have been very gratifying to the subjects of their esteem. Colonel Sadler has resolved that the portrait shall become the property of the town; and it is to be hung in the Council Chamber.

Waverley Association of Gas Managers.—The 75th half-yearly meeting of this Association will be held at Duns next Thursday, under the presidency of Mr. J. M'Laren, the Manager of the Duns Gas-Works. We learn from the programme issued by the Hon. Secretary (Mr. W. B. M'Lusky) that the business will consist of the consideration of the report of the Committee on the efforts of the North British Association of Gas Managers for standardizing meter-unions, and an address by the President; and discussion will be invited on any subject affecting the gas industry. In the afternoon the members will dine together, and subsequently inspect the gas-works, which they will doubtless find improved since their visit to the town in April, 1890.

OBITUARY.

Arthur Marshall Chambers.

It is with regret that we have to chronicle the death of Mr. Arthur Marshall Chambers, J.P., which occurred very suddenly at Scarborough at midnight on Sunday of last week. The deceased gentleman, who was in his 56th year, had been connected, from the time he reached his majority until his death, with the well-known firm of Messrs. Newton, Chambers, and Co., proprietors of the Thorncliffe Iron-Works and Collieries. Previous to 1881, when the limited Company was formed, he was a partner in the firm, and managed the several collieries carried on by it—a position in which he succeeded his father. Since 1881, he had been Managing-Director to Messrs. Newton, Chambers, and Co., Limited, so far as the collieries are concerned; Mr. George Dawson being the Managing-Director of the iron-works. His knowledge of all matters connected with the coal trade, local and general, was extraordinary, and warranted his selection to the important post of President of the Coal-owners' Federation. This position he held throughout the great strike of 1893; and it can be stated, without fear of gainsaying, that he justified the confidence placed in him by his colleagues, who, at the conclusion of the strike, presented him with a substantial cheque. Mr. Chambers had also occupied other prominent positions in the mining world. In 1890 and 1891, he was President of the Mining Association of Great Britain; and this year he was President of the Federated Institution of Mining Engineers. He also took an active interest in general local affairs, and in the question of technical education.

John Hopkinson.

In the "Journal" last week, we recorded briefly the death, as the result of an Alpine accident, of Dr. John Hopkinson, F.R.S., the eminent electrician. We learn from accounts which have since come to hand that the unfortunate gentleman, who was making a tour through the Zermatt district, started on the morning of the 27th ult., accompanied by a son and two daughters, from Arolla to ascend the Petite Dent de Veisivi, one of the striking points dominating Evolena, in the Val d'Hérens, running south from the Rhône Valley at Sion. Dr. Hopkinson was a practised mountaineer; and the party went without guides. As they did not return at the time they were expected, Mrs. Hopkinson and her friends became anxious. After dark two search parties were despatched, and a third at four o'clock on the morning of the 28th. At daybreak, Dr. Hopkinson and his children were discovered roped together and all dead on a moraine at the foot of the highest cliffs.

Dr. Hopkinson was the eldest son of Alderman Hopkinson, an ex-Mayor of Manchester. He received his early education at the Lindow Grove School and Queenwood College. In his sixteenth year he went to Owens College, Manchester, and afterwards to Trinity College, Cambridge, where he passed as Senior Wrangler and first Smith's Prizeman in 1871; being appointed a fellow and tutor of his college. While at Cambridge, he obtained the degree of Doctor of Science of the London University. He paid special attention to lighthouse machinery, in which he introduced many improvements, especially the "group-flashing" apparatus; and he was for about six years Engineer to Messrs. Chance Bros., of Birmingham. He left their service to establish himself in Westminster as a consultant, and took up electrical engineering. His principal achievement in this sphere of work was the electric light installation in Manchester, where he adopted for the first time the "five-wire" system, which was a development of the "three-wire" system of which he was the inventor. His work in connection with dynamos has been very important; and in a paper read before the Institution of Mechanical Engineers in 1879, he first introduced the methods of graphically depicting certain phenomena by means of characteristic curves, the employment of which has become as common and as useful in dynamo work as indicator curves are in engine work. Early in 1883 he made improvements on the Edison dynamo, which may be said to be the parent of the great advances which recent years have developed. In the same year he was appointed to lecture at the Institution of Civil Engineers; and on that occasion he developed certain points in the theory of alternate currents which were subsequently carried further in a paper read before the Society of Telegraph Engineers. During the next three years he worked out the theory of the dynamo machine on a thoroughly satisfactory basis. He was elected a member of the Royal Society in 1878. During 1890 one of the Society's medals was awarded to him; and in the same year he was elected President of the Institution of Electrical Engineers—a position which he held during a subsequent year. He was a member of the Senate of the London University, a member of the Council of the Institution of Mechanical Engineers, and Professor of Electrical Engineering at King's College, London.

Mr. George Furley, J.P., who was for many years Chairman of the Canterbury Gas and Water Company, died last Saturday week, in his 81st year.

The death of Mr. Charles Parsons, of Burnley, occurred last Thursday. He was a respected and active member of the Corporation; and last year he succeeded to the chairmanship of the Gas Committee on the death of Alderman Collinge. He was only in his 38th year.

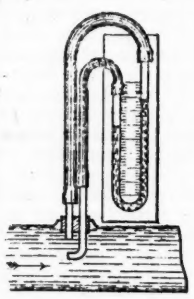
NOTES.

Repairing Reservoirs by Cemented Hoop Iron.

A recent number of the "Engineer" contained particulars of the application of the iron and cement system of construction to the repair of a brick reservoir at Orleans. The reservoir had a length of 173 feet, a width of 105 feet, and a depth of 18 feet, and held 6500 tons of water. It was built with lime mortar mixed with a certain proportion of furnace slag, and lined with a layer of lime, sand, and slag, $\frac{1}{8}$ inch in thickness, composed of two parts of sand and one of slag. For some time after the completion of the work, which was very carefully and leisurely executed, the reservoir was left dry, and showed no signs of "threads," cracks, or fissures of any description. No sooner, however, was it filled than it commenced to leak with great and dangerous rapidity. All reservoirs "weep" to some extent after filling, even when built of the best portland cement mortar; but the leakage is only of a temporary character, and, as a rule, ultimately ceases without interference. In the present instance, the leaks multiplied to so great an extent, both in number and intensity—something like 16,000 gallons passing out every night—that there was but one course to adopt, and that was to run the water off, and thoroughly re-line the reservoir. It was evident that the absence of portland cement in the composition of the coating or lining layer was the cause of it failing to be water-tight. The mixture of ordinary lime, sand, and furnace slag or dross possesses no setting properties when exposed to the action of water; and any attempt to renew the lining with the same materials would have been a wasteful expenditure as well as a failure. It was therefore determined to re-coat the interior of the reservoir with a lining composed of an iron network embedded in a layer $1\frac{1}{2}$ inches thick of portland cement. Previous instances of the success of this process fully warranted the adoption of it for the case quoted. The result was most satisfactory.

Measuring the Rate of Flow of Air Currents.

Some experiments intended to ascertain the amount of atmospheric resistance to a moving train were carried out at the Purdue University, U.S.A. For the purpose of the experiments, model trains were exposed to strong currents of air in a wooden conduit. The velocity of the air was indicated by the instrument shown in the accompanying illustration. It is a simple form of Pitot tube, consisting of a water-gauge connected with two tubes. The opening of one tube faces the current, while that of the other is normal to it. It will be seen that as both sides of the gauge-glass are in connection with the flowing stream, the difference of the height of the liquid columns cannot be due to the pressure within the pipe, but must be a result of the motion of the stream. The relation between the displacement of the gauge and the velocity of the flowing stream is expressed by the formula $v^2 = 2gh$; where v is the velocity of the stream in feet per second, and h is the difference in height of the gauge columns in feet, measured in terms of a substance having the same density with the one whose velocity is to be determined. The inner leg of this arrangement was made adjustable to different lengths, so as to enable the velocity of the stream at various points of the conduit to be explored. It was found by this means that though considerable unevenness of flow existed at the initial end of the conduit, the eddies disappeared at a distance of 35 feet from the inlet (from the Sturtevant blower), and from this point onward the flow followed lines which were approximately straight. In the centre of the conduit there was a comparatively large vein, all portions of which flowed with exactly the same velocity. The experiment was carried on at velocities from 36 feet per second, corresponding to a pressure of 1·6 lbs. per square foot, up to 149 feet per second, corresponding to a pressure of 26 lbs. per square foot.



The Inflammability of Gaseous Mixtures.

MM. Le Chatelier and Boudouard have communicated to the "Comptes Rendus" the results of a systematic investigation they have made to determine the inflammability of gaseous mixtures. They found on beginning their work that previous inquiries in the same direction—unfortunately too few—had not resulted in showing any precise relationships between the different phenomena which come into play. In order to have a complete theory of this action, it is necessary to take into account not only the combustible gases, but also the combustible vapours, which comprise a large number of compounds met with in organic chemistry. The experimenters operated always with the same known quantity of the explosive mixture—viz., 2 litres; and the experiments were repeated until they obtained two separate weights, varying by at least 10 per cent., representing respectively the limits at which inflammability did not exist and at which it commenced. They took the mean of these two numbers as representing the limit of inflammability. In the esult, putting aside hydrogen and bisulphide of carbon, the

inflammability of which is very great, it came out that for all the other bodies examined the heat of combustion of the inflammable mixture, taken for one and the same molecular volume, is comprised between 9 and 13 calories. For most of them it falls between 12 and 13 calories—numbers which do not vary more than the possible errors of experiment. The authors consequently think themselves justified in stating in a general manner that the limit of inflammability of the greater part of the carbon compounds is the same, and corresponds with a heat of combustion of about 12·5 calories. It is also found that the amount of oxygen consumed in the combustion of the compounds varies very slightly from 11·5 of the total volume of the mixture. This seems to show that one carbon compound is practically as good as another as a heat-source under these conditions. Coal gas, mixed with air in the proportion of 8·1 per cent. by volume, took about 9 volumes of oxygen for its complete combustion, and developed 10 calories for the combustion of the molecular volume = 23·5 litres at 15°.

TECHNICAL RECORD.

PACIFIC COAST GAS ASSOCIATION.

The Annual Meeting at San Francisco.

(*Continued from p.* 482.)

Mr. E. C. Jones, of San Francisco, read a paper on "An Efficient Oil-Heater." Acknowledging the necessity for preheating in connection with the use of petroleum for enriching, he pointed out that crude petroleum was a mixture of many different oils, some of which vaporized at low temperatures, while others stood a very high temperature. Peruvian petroleum did not give off any vapour under 302° Fahr., while that from California emitted 40 per cent. of its volume under 302° Fahr.; and a temperature barely sufficient to vaporize the one, might secure to a great extent the destructive distillation of the other. So the action of the superheater should approach that of complete fractional distillation; the heat being applied gradually. Finding that none of the oil-heating devices on the market were entirely satisfactory, the author designed an apparatus consisting of four 8-inch iron pipes, each nearly 20 feet long, having a number of 2-inch boiler-tubes passing through from end to end. Steam is admitted into the 8-inch tubes; and the oil to be heated is caused to circulate through the 2-inch tubes. A cast-iron head is secured to each end of the 8-inch tubes; and special means are necessary to ensure steam-tight joints. Copper rings of I shape section are used, with a cement composed of black oxide of manganese and shellac, mixed to a proper consistency with alcohol. The exterior of the tubes is coated with non-conducting composition; and being set perpendicularly, very little floor-space is needed. The apparatus as described is sufficient to serve two 12-feet generators, making a million cubic feet of gas per 24 hours; and it can be easily enlarged to any extent. Working with a steam pressure of 100 lbs., equivalent to a temperature of 328° Fahr., the petroleum is delivered at the outlet at a temperature of 275° Fahr. The author also thought it would be advantageous to place the heater horizontally, so that the steam could be admitted at the bottom and the oil at the top, as a more gradual heating would thus be secured; and he had lately increased the number of 2-inch tubes to seven, which was an improvement.

Mr. Guldin opened the discussion by remarking that he understood the author had largely increased the surface of the oil-heaters, since their first introduction, and further that the arrangement described was intended to deal with oils that did not distil at 328° Fahr. In his experience, it was not necessary to actually distil or vaporize the oil in the heater. Some of his best results were obtained with a temperature not higher than that of exhaust steam; and he depended more on mechanical distribution of the oil in the liquid form, than on actually vaporizing. He gathered that the author actually vaporized a large percentage of the oil; and in this respect his own experience differed. He found very little advantage from using live steam instead of exhaust steam; and though he delivered the petroleum into the carburetter, whereas the author admitted it to the generator, he did not think that made much difference. The author had increased the number of tubes from four to seven; and he would like some information as to the advantage thus gained. He thought the four tubes were quite sufficient. He would be glad to know if any economy of oil was secured by using high pressure instead of exhaust steam. He also criticized the structure of the apparatus, and thought better results would be obtained by reversing the action, and causing the steam to circulate through the small tubes; the petroleum to be heated being admitted to the outer case. A larger store or reserve of heated oil would thus be continuously available, and the heat would be utilized to better advantage. He also asked if the partial vaporization did not cause irregularity—first a burst of vapour, and then of liquid—in the delivery. His desire was to show that the main object was to get up a pressure that would aid the effective mechanical spraying of the liquid into the generator, rather than actually to vaporize it. It appeared that, in the author's apparatus, the steam was returned direct to the boiler, without traps or other apparatus; and this was a great advantage.

Mr. Adams said he had experienced much difficulty from the irregular delivery noted by the last speaker—first vapour, then liquid. At first he was able to get a temperature of 300° at the delivery; but lately he could not obtain over 140°. He did not know the cause, but thought there must be a deposit of carbon somewhere in the apparatus. He used a mixture of Los Angelos with other oils. He had employed steam-heaters, and also those actuated by the waste gases. The President had used heaters on the principle last named; but they gave a great deal of trouble on account of irregular heating. He therefore went back to steam heating, and was much in favour of a steam-heater that would maintain a temperature just under 300°. The Secretary said he had used a steam-heater, both with live and exhaust steam; but he thought the apparatus proposed by the author was a great improvement, and would give it a trial.

Mr. Jones, in replying, said that the 12-feet generator required about 90 gallons of oil for a ten minutes run. The four tubes first used only held 60 gallons; and he introduced seven tubes to secure a storage capacity equal to one run's consumption, so that the whole quantity had at least ten minutes in the heater before it was injected. There was no reason why exhaust steam should not be used; but there was no advantage in it. In the arrangement described, the heater was really a part of the boiler, and was so well protected by jacketting with non-conducting material that there was no loss of heat. He considered that the seven tubes gave better results as regarded economy of oil than four. There was 40 lbs. pressure on the oil at the injector, which was preferable to 20 lbs.; and he had not experienced the irregular delivery that had been mentioned. The Los Angelos oil alone would not cause trouble, as it did not begin to vaporize under 480° Fahr.; but it might give deposits of carbon, rendering periodical cleaning out a necessity.

Mr. C. M. Converse, of San Francisco, read a paper on "Gas Coke for Generator Fuel." He first pointed out that there were different qualities of coke, and that the hard clean coke from Youghiogheny coal was very different from that yielded by a mixture of South Prairie, Vancouver, and East Greta. After using coke a few days, the generator became choked with clinker, and had to be let down, as it could not be kept clear. Mixing anthracite with the coke was tried; but unless about one-third was used, there was no advantage over "all coke," beyond that they were able to use up the whole of the slack, which could not be done when using anthracite alone, and the screenings sometimes represented 50 per cent. of the bulk. Then shorter blasts were tried. The rule was to blow up the anthracite for ten minutes under 9 inches pressure. But this was too much for coke; and with six minutes blast, and nine minutes run, cleaning the fire after every six or eight runs, they got on satisfactorily for several weeks. He passed on to mention the reasons which confined them, in California, to the use of foreign anthracites or coke for the generators.

Mr. Rice said that, like the author, he was reduced to the use of inferior fuels. But he had obtained a coke from Colorado which mixed well with them; and by using half and half he was able to get along, and do much better than with coal alone. Mr. Gregory had with advantage used coke in conjunction with Welsh anthracite. Mr. Britton started using coke in his generators with one-tenth at first, and had gradually got up to one-half without trouble or disadvantage. Of course, all depended on the market price of coke; and if anyone could obtain a price for it that came near that of anthracite, they would not be bothered with it in the generators. He strongly recommended New Mexican coal, which, taken all round, was as cheap as Welsh anthracite. Mr. Crockett said one point had not been brought out very clearly by the author. He was under contract for 17,000 to 18,000 tons of Welsh anthracite, not a ton of which had been delivered. He also had a contract for 6000 barrels of oil per month, which was delivered, and had to be used or stored. Under these circumstances, it was absolutely necessary to get a substitute for the anthracite; and so they fell back on coke. This illustrated the difficulties of working in places so far away from the supply of raw materials. The President had tried anthracite and coke mixed, but found that, by the time the anthracite was at a proper temperature, the coke was burnt to ashes. He had employed coke by itself; and the only difficulty was the short runs—five minutes blowing and six minutes working—which kept the men jumping, and increased the fuel account. Perhaps one reason for this was that his apparatus did not take so deep a fire as some. There was, of course, a great difference between coke that contained 3 per cent. of ash, as compared with other kinds that went up to 16 per cent. Mr. Guldin said that, in the East, they obtained quite as good results with coke as with anthracite. The treatment of coke in the generator should, of course, be very different from that of anthracite, which was much heavier. There was a great difference in the weight of a charge of anthracite, and that of a charge of coke. He had employed coke from Illinois and Iowa coal, which was not much better than the local cokes. In estimating the quantity used, the boiler fuel should always be kept separate from the generator fuel, as the consumption of steam was an uncertain quantity. Mr. Jones said that the ash in a pound of coke represented that in 1½ lbs. of coal; and therefore he could not follow the statement that it was possible to do as well with coke as

with coal. Mr. Adams said that, notwithstanding the shorter runs, the make per 24 hours with coke would not be more than 80 per cent. of that possible with anthracite.

Mr. Converse, in replying, said he used about 45 lbs. of coke per 1000 cubic feet of gas made, including boiler fuel, which was not booked separately. He did not know about the make per 24 hours; but he produced over 21,000 cubic feet per run with anthracite, and only 12,500 cubic feet per run with coke.

DR. STRACHE'S IMPROVEMENTS IN LIGHTING BY WATER GAS.

(*Concluded from p.* 483)

The incandescent burners for lighting by means of water gas have lately been very much improved. Five sizes are made; but those which give values of 25 and 120 candles are the most popular. The consumption of gas varies from 42 to 60 cubic feet per 1000 candle-hours.

Acetylene has been tried as a carburetting agent for water gas. It is true that two great defects of acetylene—viz., its liability to explode readily and the smokiness of its flame—were greatly modified by the addition of water gas; but the high price of acetylene, and the large proportion of phosphuretted hydrogen in it, restrained its use. The absolute smokelessness of the water-gas flame, the cheapness of the light, and the complete harmlessness of the products of combustion, were no longer preserved when acetylene was added to the gas. With regard to the contamination of the air by phosphoric acid derived from the phosphuretted hydrogen of the acetylene, the removal of that impurity from the gas presents a problem of great difficulty. The cost of lighting is immensely increased when acetylene is added to the water gas. Thus 1 cubic foot of water gas yields about 20 candle-hours; and 1 cubic foot of acetylene about 42 candle-hours; or the acetylene affords only about double as much light as the water gas. With carbide at £25 per ton, the cost of raw material for the production of 1000 cubic feet of acetylene is about fifty times that of the raw material for producing the same quantity of water gas. Light from acetylene consequently costs about twenty-five times as much as light from water gas. Mixtures of the two gases give light at intermediate cost; but it is to be observed that at least 25 per cent. of acetylene is required to render a water-gas flame luminous to an extent which is serviceable. Carburetting water gas with benzol in the cold can be pursued with greater advantage than can enrichment of water gas with acetylene.

The carburetting of water gas by means of mineral oil cracked by heat forms a subject quite distinct from lighting by uncarburetted water gas. Evidently, however, the plant for the production of the latter which has been already described would, with slight adaptations, serve for the manufacture of carburetted water gas. The uncarburetted gas, however, has the advantage of giving light much more cheaply.

The following table gives some interesting comparisons of the figures relating to a light of 1000 candle-hours produced by various means. [The tables given by Dr. Strache refer to 1000 Hefner-unit-hours. We have adopted the generally accepted ratio, 1 Hefner unit = 0·877 English standard candle, for the compilation of the annexed table from those given by him.—Ed. J.G.L.]

	Assumed Values per 1000 Cubic Feet of Gas.				Consumption per 1000 Candle Hours.	1000 Candle-Hours.			
	Cost.	Calories Developed.	Cubic Feet of Carbonic Acid Formed.	Cubic Feet of Oxygen Consumed.		Cost.	Heat Developed.	Cubic Feet of Carbonic Acid Produced.	Cubic Feet of Oxygen Consumed.
	s. d.				Cubic Feet.	Pence.	Calories.		
Water gas—									
Incandescent light . .	2 0	70,787	390	470	52·40	1·25	3,710	20·4	24·6
Coal gas—									
Open flame	4 10	141,575	530	1220	366·50	21·26	51,880	194·2	447·1
Incandescent light . .	"	"	"	"	84·50	4·90	11,970	44·8	103·1
Acetylene	49 6	339,780	2000	2500	28·20	16·75	9,580	56·4	70·5
Electric light—	Per Kilowatt.				Kilowatts.				
Incandescent	0 7·2	830	..	..	4·07	29·30	3,380	..	..
Arc	"	"	..	..	1·14	8·21	946	..	..

The table shows that light from uncarburetted water gas is cheaper than that from any other source. Among other advantages of the light may be mentioned the following: (1) Its beautifully pure white colour, and its brilliancy; (2) the small amount of heat produced per unit of light developed; (3) the small amounts of carbonic acid produced and of oxygen consumed, and consequently the trifling extent of the vitiation of the atmosphere; (4) the absolute freedom of the flame from smoke and smell; (5) the gas is not mixed with air before it issues from the opening of the burner, and therefore the flame cannot strike back, as in bunsen burners; (6) the durability of the mantles, which are tougher and harder than those commonly used for coal gas; (7) the absence of the need for chimneys; and (8) the little tendency of water gas towards explosion. A mixture of air and gas is inflammable when it contains 3 per cent. of acetylene, or 6 per cent. of coal gas, or 11 per cent. of water gas.

Against these advantages can be brought only one disadvantage—viz., the higher toxicity of water gas. This may be overcome by imparting a strong smell to the gas, so that escapes of unconsumed gas to the air are readily detected. In fact, when water gas was introduced in the General Hospital at Vienna, many unsuspected leaks in the services, which had previously been used for coal gas, were detected, owing to the powerful and penetrating smell which had been imparted to the water gas. The majority of the accidents connected with the use of gas arise, however, from explosions, and not from poisoning; and the risk of explosion with water gas is at a minimum. There must be present in the air of a room 11 per cent. of water gas before an explosion can occur. If, therefore, a room of 3500 cubic feet capacity be assumed to be perfectly air-tight, so that no transfusion takes place, about 388 cubic feet of water gas would have to escape into it before the explosive limit would be reached. A burner of 100-candle power would deliver this quantity of gas to the room in 73 hours.

For industrial purposes, water gas has many very generally acknowledged advantages. It has been found excellent while in use in the laboratory of the Pathological Institute of the General Hospital at Vienna. Owing to the fact that water gas gives a smokeless flame in burners which are not of the bunsen type, it is easily possible to obtain a flame of any shape or size.

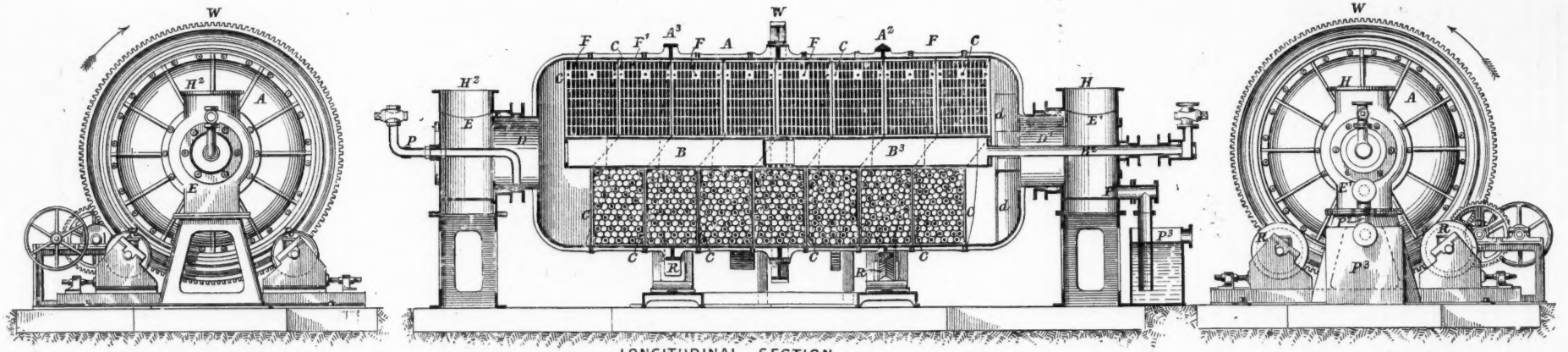
YEADON'S WASHER-SCRUBBER.

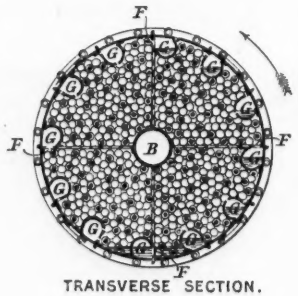
In the "Journal" for July 19 (*ante*, p. 152) an illustrated description was given of a mechanical purifying-machine invented by Messrs. Yeadon, Son, and Co., of Leeds. We have now the opportunity of similarly describing a washer-scrubber which has been invented and is being brought out by the same firm. It will be seen, by a comparison of the two inventions, that the same general principle has been utilized in both—viz., a revolving cylinder fitted with an internal central tube and spiral screw, with modifications in detail to suit the different purposes for which they are separately intended.

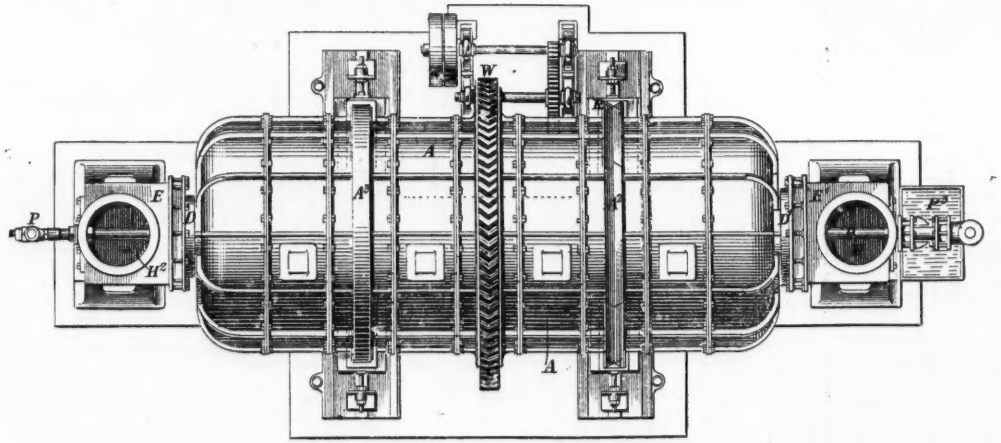
It will be seen from the illustration that inside the revolving cylinder A, and running nearly its entire length, is a central tube B, closed at one or both ends. Between the outside circumference of this tube and the internal surface of the cylinder there is fixed the continuous spiral screw C C, which also runs nearly the whole length; both edges of this screw being fitted with angle-iron for securely fixing it to the cylinder, and made perfectly gas-tight. The tube is thus carried by the cylinder to which it is attached by the spiral screw; the whole revolving together. The ends of the cylinder are rounded off to a smaller diameter, as at D D^1, and made suitable for revolving in stationary mouthpieces E E^1, at each end. These mouthpieces are fitted with adjustable glands to keep the ends gas-tight; E^1 being for the inlet, and E for the outlet of the gas. The edges of the spiral screw being gas-tight, the gas must follow the space formed by the spiral screw. In different parts of this spiral screw, and at suitable distances, are fixed any number of perforated division-plates F, through which the gas has to pass. These plates thus divide the area contained in the screw into a series of chambers, each of which is filled in with wood balls; the plates preventing them working through the cylinder.

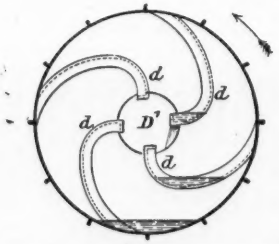
In any part of the mouthpiece E a pipe P is inserted for the inlet of the water into the cylinder. At the bottom of the mouthpiece E^1 is fixed a sealed outlet-pipe P^2, ending in the cistern P^3 for the escape of the ammoniacal liquor or foul water after it has passed through the cylinder. The cylinder end D^1 is fitted with spiral or coil pipes *d*, by means of which the ammoniacal liquor is raised from the bottom of the cylinder in revolving, and delivered automatically through the small end and the sealed pipe P^2.

At the back of each of the perforated division-plates, and close to the internal surface of the cylinder, is fixed a bucket G for raising the water lying at the bottom of the cylinder, and pouring it over the wood balls, so as to keep their surfaces









constantly wet and dripping, carrying the water forward with the next division of the screw. Other auxiliary buckets, as at G^1, perforated or solid, are fixed to the internal surface of the cylinder, to pour the water on to the balls; the number, size, and perforation of these buckets being adjusted to keep the balls constantly wet, and to carry the water continuously forward through the spiral screw.

On the outside of the cylinder there are bearing-rings A^3 and A^3, turned so as to revolve truly on the bearing-rollers R underneath. One of these rings, as at A^2, is made of Λ shape, with the bearing-rollers to suit, to prevent the cylinder working endwise. There is also fixed on the circumference of the cylinder a toothed wheel W, driven by any suitable gearing, for communicating the revolving motion.

The pure water is admitted through the pipe P, and, after going through the cylinder, escapes by the sealed outlet-pipe P^2. The gas entering at H meets the water, and, after passing through the cylinder, escapes at the outlet-pipe H^2. If found advisable, an inlet-pipe connection can be arranged to the centre or any other part of the central tube, as at B^2 and B^3, from any outside cistern, by means of which ammoniacal or other liquor can be admitted there into the screw space to assist in the washing of the gas.

In some other rotating washers, a large area of washing space is lost in consequence of nearly one-half of each drum being always immersed in the water, in addition to the loss of space outside and between the drums themselves. By the use of the Yeadon washer, the patentees claim that, with the exception of the area occupied by the small central tube, the whole of the internal cubic area of the cylinder is utilized for the purpose of the gas coming in contact with the wet surfaces of the balls, and passing freely through—thus requiring proportionately much less length and diameter than with other rotating washers; and that, in addition, by the gas flowing regularly and continuously through the space formed by the spiral screw, it is more evenly diffused and brought into contact with the wet surfaces of the balls. They also claim that, by dispensing with the ordinary internal shaft, complicated drums, and other frictional surfaces, the washer is simpler, less liable to get out of order, more easily repaired, and requires less motive power; thus securing greater efficiency, with a considerable saving in first cost, motive power, and repairs.

REGISTER OF PATENTS.

Treating Oxide of Iron.—Mooney, F. M., of Dublin. No. 19,590; Aug. 25, 1897.

The patentee claims as his invention: Treating the residue from the burning of spent oxide by saturating the residue with water, removing and neutralizing any free acid that may exist in the residue when moistened, and mixing therewith "suitable fibrous matter," whereby the residue is rendered available for re-use. He says he has found that this result is arrived at much more expeditiously, and with greater certainty, by causing the residue from the burning of the spent oxide to be drawn from the kilns in the heated state, and while still hot to be immersed in water, and allowed to settle down. The excess of supernatent liquor or water is then drawn or run off; and the residue, when sufficiently drained or dried, is intimately mixed through a disintegrator, or by other suitable means, with some fibrous or light organic matter—such as peat-mould or sawdust, or some cheap or waste material, "in such proportion as may be required to obtain the proper degree of openness or porosity necessary to allow of the free passage of the gases to be purified through the mixture in the usual way."

For the efficient absorption of sulphuretted hydrogen by hydrated oxide of iron, the patentee points out that it is necessary for the oxide to be thoroughly saturated or permeated with water, and practically clear of free mineral acid. These two requirements are said to be cheaply and expeditiously satisfied by the method above described; for "when the burnt oxide is drawn from the kilns or burners and immersed while hot in water, in the cooling of the hot residue that immediately ensues, the water is drawn or absorbed into practically all parts of the particles of the oxide of iron that constitutes the residue, and the excess or supernatent water that is drawn or run off as described will be found to contain a certain amount of free acid that has been washed from the burnt residue. This free acid, if not removed or neutralized, would interfere to some extent with the subsequent absorption of the sulphuretted hydrogen in the usual way; and if any such free acid remain in the residue after all the excess water has been drained off, it may, if necessary, be neutralized by sprinkling with weak alkaline liquid."

Increasing the Light of an Argand Burner.—Hawes, M. H., and Farringdon, R., of Shoe Lane, E.C., and Hand, W. H., of Richmond. No. 29,304; Dec. 10, 1897.

By this invention the illuminating power of any flame—gas or oil—of annular cross section is increased by placing within the flame-ring a central core-body or plug of refractory material in close proximity to, but not touching the flame; provision being made for access of air to both the outside and inside of the circular wall of flame. The material of which this core is composed is preferably a mixture of 75 parts (by weight) of pipe clay, 5 parts of asbestos, 10 parts of oxide of magnesium, 5 parts of calcium hydrate, and 5 parts of zirconium. The patentees are careful to point out that the refractory body is not intended to be an incandescent body in the ordinary meaning of the term. The flame does not impinge upon it, and is intended not to touch it at all.

Prepayment Gas-Meters.—Sutherland, A. G., and Wright, G. F. & G. E., of Birmingham. No. 2004; Jan. 25, 1898.

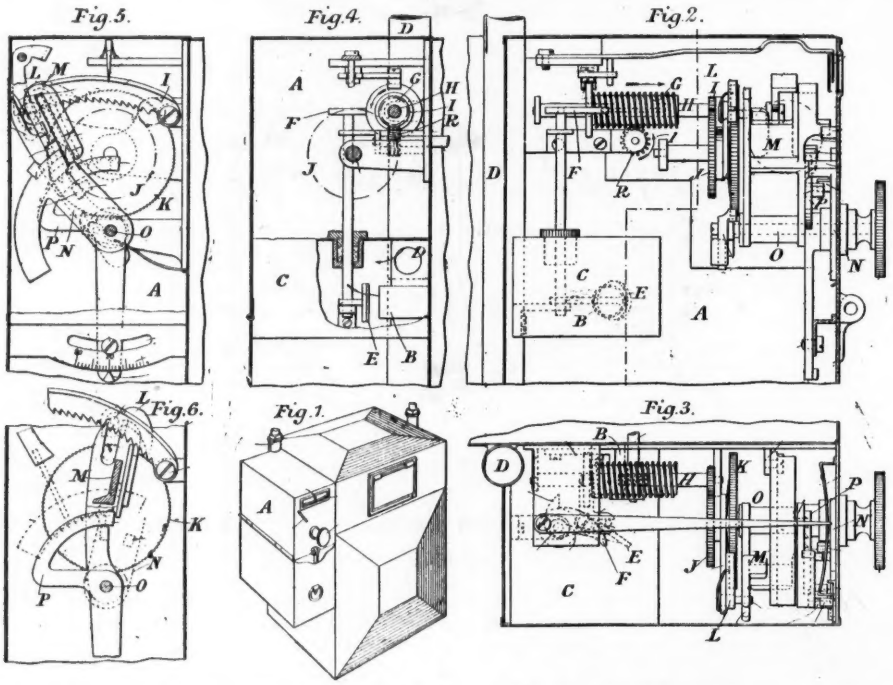
This prepayment mechanism for gas-meters is of the kind wherein a sleeve sliding upon, but rotating with, a spindle that is actuated by the coin, has an external screw-thread, into which takes a toothed pinion rotated by the mechanism, and which acts as a screw nut to the threaded sleeve, causing it to be screwed forward on the rotation of its spindle by the coin-actuated mechanism, and thereby to effect the opening of a gas-admission valve by means of intermediate gear; while on the passage of gas through the meter, the consequent rotation of the pinion effects the moving backward of the threaded sleeve, and the closing of the admission-valve.

Fig. 1 gives a perspective view of a meter with the mechanism attached. Fig. 2 shows an enlarged vertical longitudinal section through the prepayment mechanism; fig. 3, a sectional plan; fig. 4, a vertical section on the line X X; fig. 5, an end view with the coin-cradle in position for receiving a coin; and fig. 6, the same view with the cradle moved into the forward position for delivering the coin.

The gas is supplied to the meter by the pipe D, and passes through a closed chamber C within the box A, and issues from the chamber through the pipe B, provided with a valve E which, when closed, stops the supply of gas. The valve is carried by an arm projecting from a spindle, the partial rotation of which in one direction or the other opens or closes it. The spindle carries on its upper end an arm or lever F, having a projection against which can bear a flange on the end of a sleeve G, which has an external screw-thread, and is mounted upon a spindle H, so as to be capable of sliding longitudinally thereon, but caused by a feather-and-groove (or other suitable means) to rotate therewith. The spindle carries a pinion I gearing with a toothed wheel J fixed on another spindle, upon which is also fixed a second toothed wheel K. Engaged with this wheel is a pawl L mounted on an arm, that can rock freely, and having a stud projecting into a slot of the coin-cradle M, which can rock upon a fixed axis O. This coin-cradle is adapted to receive a coin when in the position shown in fig. 5; being then opposite a slit in the box A.

At the right-hand side of the coin-cradle is a quadrant arm P, also mounted loose on the axis O, having serrations on its top edge and a laterally projecting stop at one end, and having a downwardly extended tail-piece with an index pointing on an arc scale, which indicates the number of unit volumes of gas to be supplied for a penny or any other coin. As this quantity will vary according to the price of gas, the tail-piece, and consequently the quadrant arm P, can be adjusted in position relatively to the scale, and secured in such adjusted position by means of a screw passing through a slot in the bar S carrying a scale. By this adjustment, the stop of the arm P is brought nearer to, or farther from, the extreme left-hand position of the coin-cradle shown at fig. 5; and thus in varying the extent of stroke of the coin-cradle, a variation in the quantity of gas supplied for the value of a coin is also effected.

On the same axis as the coin-cradle is also mounted loose an arm N, fitting closely against the side of the cradle, and connected to an external knob or button by a boss passing through the side of the casing, so that by turning the knob the arm can be rocked backwards and forwards on the axis O. The arm N also has a stud, which corresponds in position with notches formed in the contiguous side of the cradle M, so that if, when it is rocked by the button, there is no coin in the cradle, the stud will pass backwards and forwards through the notches without actuating the cradle, and therefore without moving the admission-valve E. If, however, a coin is introduced into the cradle, so as to occupy the position shown in dotted lines in fig. 2, while the arm N is in the position shown in fig. 5, then on turning the arm to the right the stud will, after passing through the left-hand notch, bear against the portion of the coin which projects between the two notches; and in pressing the coin against the front side of the cradle, it will push the latter forward on its axis O. By this motion of the cradle, the arm with the pawl L will also be turned forward on



its axis; and in effecting a corresponding partial rotation of the wheels K and J it will also, through the wheel I, rotate a spindle H and a threaded sleeve G.

In gear with the underside of the threaded sleeve G is a pinion R on a spindle, which passes through the meter casing to the meter mechanism, and is connected with it so as to be rotated in the direction of the arrow 1 in fig. 2 when gas is passing through the meter. If now, while the pinion R is either stationary or is being slowly rotated, the sleeve G is rotated in the direction of the arrow in fig. 4 by the rocking motion of the coin-cradle, the sleeve will be advanced a certain distance in the direction of the arrow shown in fig. 2, by working on the teeth of the pinion R, as in a nut.

Manufacture of Water Gas.—Coyne, J., of Pittsburg, U.S.A. No. 7592; March 29, 1898.

In the words of the patentee, this is "an improvement in the art of manufacturing gas." It consists in "passing air upwards through an incandescent body of carbonaceous material and a superincumbent charge of fresh fuel ignited from the incandescent body and hot gases passing therethrough, and then commingling the gases so produced with steam or steam and oil, and passing such commingled gases and steam or steam and oil through an incandescent body of carbonaceous material in such manner that the gases will be subjected to a gradually reduced heat." The details are not set forth in the specification apart from a series of eight sheets of detail drawings.

Gas Lamps and Burners.—Loeser, I., and Lecomte, A., of Paris. No. 10,008; May 2, 1898.

This is another of the double-chimney form of argand burner designed for use with or without an incandescent mantle. Just what difference exists between this burner and many other similar burners introduced of late years, it is difficult to discover from the specification, which has evidently been carefully prepared in Paris and sent to England through an agent in Brussels. The result is a curious mixture of words, a fair sample of which appears in the three claims to the invention, which are given in these words: "We declare that what we claim is: 1. The principle of the suspension and the centring of the inner chimney of a heat-recuperating apparatus, the supporting point being taken on the burner itself or on a part screwed thereon, or on the glass tube or outer chimney, being but slightly heated, for the purpose to prevent the softening and the deformation of the inner glass-chimney; the centring and supporting of the inner chimney being obtained by a recuperator, punched circles, claws, these parts serving at the same time to support the shade of the lamp, or still further by the outer glass-chimney itself. 2. A supporting-guide chimney, operating as a recuperator and a peculiar burner-cap or crown, to help the heating of the air and avoiding the action of the air-currents. 3. The application of the principle of suspending and centring the chimney to all kinds of burners with or without incandescent mantle, or of gas or oil lamps.

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17,997.—Miller, C. A. & F. J., "Acetylene gas-lamps." Aug. 22.
18,063.—Gustafson, K. G., "Acetylene gas apparatus." Aug. 22.
18,072.—Jones, B., "Acetylene gas-generators." Aug. 23.
18,075.—Bennett, J. F., and Moorwood, T. P. & H. S., "Gas or vapour producers for gas and oil engines." Aug. 23.
18,133.—Kremer, J., "Acetylene gas-generators." Aug. 23.
18,149.—Sterne, A. J., "Gas-igniting devices." Aug. 23.
18,171.—Checkley, R., "Acetylene gas-generator." Aug. 24.
18,178.—Walker, W., "Acetylene gas-generators." Aug. 24.
18,182.—Anderson, W., "Anti-vibrating arrangement for incandescent gas-burners." Aug. 24.
18,212.—Smith, J. F., "Chandeliers and fittings for acetylene and other gases." Aug. 24.
18,220.—Engasser, E., "Generating acetylene gas." Aug. 24.
18,293.—Ginzler, J. C., "Coin-freed gas or other fluid meters." Aug. 25.
18,328.—Rhodes, E., "Gas and like meters." Aug. 26.
18,345.—Niel, A., "Regulating the flow and pressure of gas." Aug. 26.
18,403.—Tweedie, R. O., "Anti-vibrator for incandescent gas-burners." Aug. 27.
18,406.—Hawkyard, J., and Braddock, J., "Supplying gas or other fluid on prepayment." Aug. 27.
18,411.—Wright, J. W. B., and Darwin, H., "Atmospheric burners for gas heating-stoves." Aug. 27.
18,435.—Van Praag, D. J., "Acetylene gas-generator." Aug. 27.
18,436.—Matthyssens, G., "Acetylene producers." Aug. 27.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Gas Consumption by Cookers.

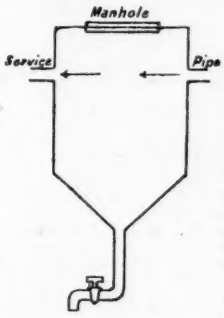
Sir,—I have recently been asked to state what annual average consumption might be expected from a medium-sized packed and enamelled gas-cooker. My own experience points to an average of 25,000 cubic feet per annum. It occurs to me, however, that it might be interesting to your readers if some engineers who have separate meters attached to such cookers (list price about £6 to £7 with, say, a 14-inch square oven, three boiling-burners, and a separate griller) would give their average annual consumption and any other relative information. The circumstances in various houses are, of course, widely diverse; but, after all, an average can be struck, and it is valuable in ascertaining whether a consumption below this amount may not be increased (involving necessary instruction in *all* the uses a gas-cooker may be put to on the part of the visiting official), or, in the case of an excess, the inquiry as to whether waste may not be taking place.

I trust some engineers will favour you with their figures—omitting, of course, any makers' names.

132, *Queen Victoria Street, E.C., Sept.* 3, 1898. E. W. T. Richmond.

The Value of House Cisterns.

Sir,—Dr. C. Hallen and other Medical Officers of Health have written that the reason why there are no cisterns at the East-end is because the local Sanitary Authorities have condemned them, and have ordered their removal so that a direct connection with the main might be made, because they hold that cisterns are unsanitary for drinking and cooking purposes. They have evidently never seen, or have ignored, the report of Colonel Ducat and Dr. Barry, Inspectors of the Local Government Board, on the East London water supply, which was made to the President, the Right Hon. H. Chaplin on Nov. 11, 1895. The following extracts from this report may at the present time be of public interest: "Incidentally we would refer to the advantage to the consumer of having a small storage of water in every house. It was shown that, throughout this scarcity, persons occupying houses provided with cisterns suffered no inconvenience. No doubt ill-designed and badly-placed house cisterns are open to objection from a health point of view; and nothing could be further from our intention than to advocate any return to the old defective cisterns, with their moveable wooden covers. But we do advocate the provision of *properly-designed cisterns*. By a properly-designed cistern we mean a cistern which shall be so constructed as to exclude alike the possibility of the entrance of dirt from the atmosphere and the accumulation of any deposit from the water itself, whilst at the same time the water in the cistern is under the same pressure as the water in the main itself—in other words, the cistern that would satisfy us is merely a local enlargement of the water-main. Such a cistern is, in our opinion, subject to none of the objections commonly urged against the use of cisterns. Under the best arrangements, there must be times when short periods of interruption of a constant service will occur; and at such times the want of water for domestic purposes, for flushing water-closets, sealing water-traps, &c., is calculated to lead to conditions injurious to health which should not be allowed to exist, and which a *proper use of really efficient cisterns would guard against*. . . . In our opinion, the inconvenience experienced by consumers was much aggravated by the want of proper means for domestic storage of water. . . . That for the protection of the consumer against unavoidable temporary intermissions of the supply, we consider that there would be distinct advantage in having properly-designed means of storage of water in houses."



I enclose a rough sketch of a form of cistern which would meet the requirements the Inspectors' report. But surely it is not beyond the inventive powers of sanitary engineers to devise several forms of properly-constructed covered cisterns, which will not only exclude dirt, but which by adequate packing will prevent variations in the temperature of the water.

Aug. 30, 1898. A. H. Smee, Chief Medical Adviser, Gresham Life Assurance Society, Limited.

Southport Corporation Gas Undertaking.—A Southport contemporary states that the Corporation Gas Committee have decided to proceed on the lines advocated by a number of the members of the Council at their last meeting (see *ante*, p. 388), and appoint an expert to report on the whole working of the gas undertaking.

Effect of the Adoption of Incandescent Gas Lighting.—At the recent half-yearly general meeting of the East Ardsley Gas Company, the Chairman stated that there had been a falling off to the extent of about £140 in the revenue from the sale of gas, chiefly owing to the Great Northern Railway Company fitting up all their premises with incandescent gas-lights.

Belfast Gas Profits and the Borough Fund.—In response to a deputation (headed by the Lord Mayor), the Gas Committee of the Belfast Corporation have agreed, subject to the legality of the course being ascertained, to transfer £5000 from their surplus to the borough fund, which is in a low condition at the present time, owing to the large and increasing demands made upon it for sanitary purposes and other objects of a similar nature.

Gas-Works Extensions at Ashford.—Mr. W. E. O. Meade-King has held an inquiry at Ashford in regard to an application by the District Council for the permission of the Local Government Board to the raising of a loan of £14,000, for thirty years, for extensions and alterations at the gas-works. The Consulting Engineer (Mr. E. H. Stevenson) gave an account of the proposed improvements. He said the present works were hardly large enough for the size of the town. The maximum output was 220,000 cubic feet of gas a day, which was only equal to the consumption at the present time. The consumers last winter complained that the pressure was not high enough. The new works would comprise a retort-house, 48 retorts with regenerative furnaces, and a telescopic gasholder capable of storing 140,000 cubic feet of gas. If these alterations and extensions were carried out, the works would be capable of producing 330,000 cubic feet a day.

Sales of Stock and Shares.—Some original consolidated stock of the Newmarket Gas Company was recently sold at from £162 to £165 per £100 lot. At a sale of shares at Grantham, £20 original shares in the Grantham Gas Company were sold for £42 5s. and £42 10s. each; and new shares for £31 5s. apiece. On the same occasion, £10 shares in the Grantham Water Company fetched £28 12s. 6d. and £28 15s. each. At a recent sale at Gosport, some £25 shares in the Gosport Gas Company realized from £45 15s. to £46 10s. apiece. At the office of the Newcastle and Gateshead Gas Company last Wednesday, Mr. Robert Mack sold by auction £12,500 of the Company's 3½ per cent. debenture stock. It was put up in lots of £100 each; and the average price obtained was about £110 17s. 6d. The best price was £113 10s., and the lowest £110 10s. Five lots were sold at £113 10s.; 5, at £112; 28, at £111; 5, at £110 17s. 6d.; 17, at £110 15s.; 10, at £110 12s. 6d.; and 55, at £110 10s. The sale realized £13,856 7s. 6d. At Airdrie on the same day Mr. A. Morrison exposed for sale 1000 new ordinary £10 shares in the Airdrie and Coatbridge Water Company. The prices realized ran from £13 10s. to £14 2s.; the average being £13 17s. Among a batch of miscellaneous shares sold by Mr. W. G. Stansfield at Bradford last Thursday were fifty £5 fully-paid shares in the Metropolitan Gas Company of Melbourne, which realized £7 7s. 6d., and four "A" shares in the Clayton, Allerton, and Thornton Gas Company, which found a purchaser at £16 17s. 6d. At Alfreton on the previous day, 72 £1 shares in the local gas company were sold—half at £2 0s. 6d., and the remainder at £2. For five original £5 shares, £13 10s. each was obtained.

MISCELLANEOUS NEWS.

THE GAS AND WATER ORDERS OF THE PAST SESSION.

The report of the Board of Trade on their proceedings under the Gas and Water Works Facilities Act, 1870, during the past session was issued last week. It states that in December, 1897, eighteen applications for Provisional Orders were made to the Board—eleven relating to gas, and seven to water undertakings. The amount of capital proposed to be authorized was £299,750 by shares and £76,687 by loans; and of the total amount, £205,000 of share and £49,250 of loan capital related to gas undertakings, and £94,750 of share and £27,437 of loan capital to those for the supply of water.

The applications for Gas Orders were in respect of Budleigh Salterton, Cannock, Churwell, Coatbridge, Colwall, Crossgates (with Halton and Seacroft), Freshwater, Great Marlow, King's Lynn, Slough, and Whitchurch (Salop). Three of the applications—viz., those relating to Coatbridge, King's Lynn, and Slough—were in respect of undertakings already authorized by Parliament. The Coatbridge Company applied for authority to raise additional capital; the King's Lynn Company, to construct additional works and raise more capital; and the Slough Company applied to acquire by agreement additional lands and to construct works. One application—that of the Freshwater Gas Company, Limited—was for authority to construct and maintain new gas-works. The remaining seven applications were for power to maintain and continue works already existing without parliamentary authority; and in the Budleigh Salterton and Great Marlow cases, it was also desired to construct additional works. Objections were lodged against several of the applications, and were fully considered by the Board of Trade. The Churwell and Freshwater applications were not granted. In the other cases, Orders were granted subject to certain modifications and amendments.

The Churwell application was withdrawn by the promoters in consequence of their having agreed to sell the undertaking to the Morley Corporation; the latter having promoted a Bill in Parliament for this and other purposes. In the case of the Freshwater application, the consents of the Freshwater and Totland Parish Councils were not obtained; and the promoters asked the Board to dispense therewith. The Board thereupon appointed Lieut.-Col. G. W. Addison, R.E., to hold an inquiry at Freshwater, and to report to them on the matter. Upon consideration of his report, they refused to dispense with the consents of the Local Authorities; and the application was therefore not proceeded with.

The sliding-scale of price and dividend was adopted in the Coatbridge and Slough Orders. In the former, the initial price per 1000 cubic feet of gas was fixed at 2s. 11d. for reduction, and 2s. 6d. for increase of dividend. In the latter, the initial price was fixed at 4s. 5d. within the authorized limits of supply other than the parish of Datchet, and 4s. 8d. within that parish. In the following Orders, a maximum price per 1000 cubic feet of gas was fixed; power being reserved to the Board, after three years, to alter that price or substitute a sliding-scale: Budleigh Salterton, 5s.; Cannock, 4s. 6d.; Colwall, 5s. 8d.; Crossgates, Halton, and Seacroft, 4s. 6d.; Great Marlow, 4s. 10d.; Whitchurch, 4s. 7d.

In the Crossgates Order, the minimum illuminating power of the gas to be supplied was fixed at 16 candles, and in the Cannock Order at 14 candles. In the remaining Orders, the usual minimum of 15 candles was prescribed where necessary.

The supply of gas in bulk beyond the limits was authorized, subject to the usual limitations, in the Budleigh Salterton, Cannock, Colwall, Crossgates, Great Marlow, and Whitchurch Orders. The usual clauses as to the sale of additional capital by auction or tender, and limits of dividend, the creation of insurance and reserve funds, the testing of gas, the quantity of land to be taken by agreement, &c., were inserted; and, where necessary, the Gas-Works Clauses Acts, 1847 and 1871, were incorporated.

In the Cannock Order, provisions of an unusual nature were inserted as the result of an agreement between the promoters and the local authorities concerned. They related to the limit of dividend on the original capital to 7 per cent., the sale of mortgages by auction or tender, the prescription of a higher minimum pressure and a lower minimum illuminating power of gas than are usual in Acts and Orders, the sale of the undertaking to the District Council in certain circumstances, &c.

Special clauses were inserted in the Budleigh Salterton and Crossgates Orders as to the supply of gas for public lighting, in the Cannock and Crossgates Orders for the protection of mineral rights, and in the Budleigh Salterton and Cannock Orders as to the breaking up and repair of streets.

Two Bills to confirm the Orders were introduced into the House of Lords on the 26th of April. The Bills passed through the various stages without opposition, and received the Royal Assent on the 25th of July.

The applications for Water Orders were in respect of Broughton-in-Furness, Ightham and Wrotham, Portsmouth, Ross, St. Neots, South Hayling, and Wrexham.

The Broughton and the Ightham and Wrotham applications related to new undertakings; the St. Neots application was to substitute works on a new site for those authorized by the St. Neots Water Act, 1897, the proposed site of which had been found unsatisfactory; the South Hayling application was for additional works and extension of limits of supply; and the Portsmouth, Ross, and Wrexham applications were for additional capital in respect of existing undertakings.

The promoter of the Ightham and Wrotham Order (Mr. Hale) was unable to procure the consents of the Local and Road Authorities; and he applied to have them dispensed with. The Board of Trade thereupon appointed Lieut.-Col. H. A. Yorke, R.E., to hold a local inquiry and report on the case. In the course of his report, he said the case did not appear to be one which called for any elaborate analysis of the arguments and evidence produced before him at the inquiry, or for any criticism in detail of the various clauses of the Order. He was unable to find in Mr. Hale's proposals, or in the arguments put forward on his behalf, any valid reason for dispensing with the consent of the Wrotham Urban District Council, or for granting the Order not only against their wish, but also in opposition to the views of the largest ratepayers. The Council were prepared to carry out a scheme which would give a better and purer supply of water than that proposed by Mr. Hale; and the Inspector thought they should be afforded an opportunity of performing this public duty. He therefore advised the Board not to grant the application; and they acted accordingly.

The consents of the St. Neots Rural District Council and the Huntingdon County Council were not forthcoming; and, on the application of the promoters, Colonel Yorke was appointed to hold a local inquiry and report on the matter. Upon consideration of his report, the Board decided to dispense with the consents, and to make an Order, subject to necessary amendments. In accordance with section 4 of the Gas and Water Works Facilities Act, 1870, a special report was made to Parliament on the subject. The Order, as already stated, was applied for by the Company to enable them to abandon the works authorized by their Act of 1897, and to construct others on a new site. Colonel Yorke reported that, as this site was contiguous to that already sanctioned by Parliament, and as the strata from which the water was to be derived were the same in both cases, there did not appear to be any reason why the change should not be authorized, especially as the surface of the ground round the new site was less liable to pollution from manure than was the case at the original site. Under these circumstances, he recommended the Board to grant the Order, subject to certain alterations agreed upon with the St. Neots District Council. Acting upon the recommendations contained in the report, the Board decided to grant the Order with the alterations above referred to.

With the exception of the case of Ightham and Wrotham, all the applications were granted; and Provisional Orders were made with such amendments in detail as were required to satisfy reasonable objections, or to protect the interests of consumers.

A Bill to confirm the Water Orders was introduced in the House of Lords on the 2nd of May. The Broughton Order was petitioned against by the Furness Railway Company; but a protective clause, which had not previously been asked for, having been agreed with the promoters, the petition was withdrawn. No further opposition was offered to the Bill; and it received the Royal Assent on the 2nd of August.

The total number of Orders made by the Board since the passing of the Act is 443, of which 435 have been confirmed by Parliament.

MORECAMBE GAS COMPANY.

Annual Meeting—Extension of the Works.

For some time past, considerable extensions have been in progress at the Morecambe Gas-Works; and their completion was on Tuesday last celebrated by a special luncheon given to the shareholders and others at the King's Arms Hotel.

Prior to the luncheon, the annual meeting of shareholders was held—the CHAIRMAN (Mr. W. G. Welch) presiding. The annual report and balance-sheet to the end of June, noticed in the "JOURNAL" for the 23rd ult., were submitted. The Chairman, in his address, entered at some length into the increase of capital from time to time, and the manner in which it had been used; and he gave particulars of the extensions that have been made. The report was unanimously adopted; and the dividend recommended was declared.

With regard to the extensions that have been carried out, it may be mentioned that the old retort-house was 91 feet long by 42 feet wide. This has been lengthened, and the side wall taken out, so as to give space for the new retort-bench. The new portion is 40 ft. 6 in. wide; and the retort-house, as enlarged, is now 120 feet long by 82 ft. 6 in. wide. The old portion of the retort-house it is intended to utilize as a coal-store. Down the centre of the house, and supporting both roofs, is a large girder with one support in the centre; an open space being thus given over the whole of the house. The new retort-house is erected in two sections of four through arches each; and each arch contains 16 ⏀ retorts 22 in. by 15 in. by 10 ft. long—making a total of 128 mouthpieces. The retorts are heated by sixteen of Drake's patent regenerator furnaces. Each section of bench is fitted up complete with ironwork, self-sealing mouthpieces, &c.; each bed having an arrangement of valves whereby any eight retorts can be put off without interfering with the others. Eighteen-inch steel foul mains extend round the retort-house, and connect to the present condenser. A chimney has been erected between the two sections of the retort-stack, sufficiently large for working the whole eight through beds. On each side of the retort-bench subways 8 feet wide have been provided for working the regenerators; and an inclined approach has been formed at one end, with a steps' approach at the other. The whole of the retort-bench, furnaces, &c., have been put into a concrete envelope; the bottom being 4 feet thick and the sides 18 inches thick, on account of the difficulty experienced both in connection with water and the nature of the soil. When in full work, these benches will be capable of producing over a million cubic feet of gas per day. The whole of the work, including the retort-house, roofs, bench, &c., has been carried out by Messrs. Jonas Drake and Son, of Halifax.

At the close of the meeting, the shareholders adjourned to the King's Arms Hotel for luncheon. Mr. WELCH occupied the chair; and among those present were Mr. Matthew Simpson, the Vice-Chairman of the Company, Mr. Robert Birkett, Mr. Robert Briggs, Mr. W. O. Roper, and Mr. Marsland, of Messrs. Jonas Drake and Son.

The toast of "The Queen and Royal Family" having been honoured,

The CHAIRMAN, in proposing "Prosperity to the Morecambe Gas Company," expressed the pleasure that the Directors felt in seeing so many present that day. It was rather an important occasion in the history of the Company. They had greatly extended the works, which were now in very good order. He then gave some interesting particulars to illustrate the progress made by the Company since the inception of the undertaking. The works, in their original form, were built in 1858, at a cost of £2100. The first dividend paid was one of 5 per cent.; and the last (1898) was at the rate of 12 per cent. The capital outlay of the Company, which amounted to £2200 in 1858, had increased until in 1898 it reached £43,000. The make of gas had also shown a large increase. In 1875, the production was about 6 million cubic feet per annum. In 1880, it was 9 million cubic feet—or half as much again.

In 1885, it rose to 10 million cubic feet; and in 1890, to 18 millions. In 1895, the amount was 31 million cubic feet; and in 1898, 55 millions. They would thus see that in 1875 the make averaged half a million cubic feet a month; whereas at the present time they were producing 4½ million feet per month, and the retort-house was capable of turning out six times this amount. Referring to the *personnel* of the present Board, the Chairman remarked that Mr. Robert Birkett was one of the original Directors; Captain Briggs joined the Board in 1865; Mr. Simpson had been a Director 20 years; and he himself had been on the Board 19 years. Their Manager (Mr. W. Duff) had been with them 31 years; and Mr. Edward Clark, one of the Auditors, for 20 years. The Directors felt thoroughly satisfied with the present position of the Company. The gas undertaking had in the past fully answered the expectations that had been entertained. From time to time the Directors had formed very sanguine schemes with regard to the future; and they had never yet been disappointed. They were looking forward to still greater developments in the next little while.

Mr. W. O. Roper, in proposing "Prosperity to Morecambe," incidentally referred to the loss which electrical science had sustained by the appalling accident to Dr. John Hopkinson and his three children. Mr. Roper also referred to the advantages Morecambe enjoyed in the shape of pure water and pure gas; and, in conclusion, he observed that with the works they now possessed, and the various undertakings that the Local Authority had in hand, Morecambe ought to prosper in the future even more than it had done in the past.

Mr. Clark, with whose name the toast was coupled, responded.

The Chairman proposed the "Health of the Contractors." He said the Engineer and the Directors felt perfectly satisfied with the manner in which the work had been carried out by Messrs. Drake and Son.

Mr. Marsland responded to the toast.

The "Health of the Chairman and Directors of the Company" was next proposed by Mr. F. S. Smith.

Mr. Simpson, in replying, alluded to the diligence and energy with which the District Council carried out their work in Morecambe—resulting advantageously both for landowners, householders, and visitors to the town.

The proceedings then closed.

THE EXPLOSION AT THE PLYMOUTH GAS-WORKS.

The Adjourned Inquest.

The adjourned inquest on the body of Aaron Parkes, fitter, of Hollinwood, Lancashire, who died from injuries sustained through an explosion at the Plymouth Gas-Works on July 19 (see *ante*, pp. 217, 267), was held last Friday, by Mr. R. B. Johns, the Borough Coroner.

Mr. Pearce, Solicitor, appeared for Messrs. Cutler and Sons, the manufacturers of the water-gas plant at the works; and the Gas Company were represented by Mr. J. Thomas, the Secretary, and Mr. A. Wharton, the Manager.

The Coroner explained that the inquest was adjourned from the 28th of July for the attendance of other men injured in the explosion. As he understood, it was merely a question of whether there was any negligence or responsibility upon any of the people who were employed at the time in connection with the work. Messrs. Cutler and Sons had put up the water-gas plant, which had been completed for some time, and was handed over to the Company. In July they were engaged in the erection of additional plant, when something went wrong in connection with the first set. Mr. Ernest Cutler, who represented the manufacturers, was on the works at the time, and his attention was called to this; and it was while he and others were endeavouring to rectify what was wrong, that the explosion occurred. Apparently Mr. Cutler relied upon one of the workmen named Cole to do certain things, and Cole relied upon Mr. Cutler; and it was because of a misunderstanding that the accident happened.

Mr. *S. Cutler* produced and explained plans illustrating the water-gas plant and the mode of operating it. He said it happened in this process that deposits of carbon took place, and it was occasionally necessary to clear away this obstruction to the free passage of the gas. When there was a stoppage, it was shown to the people in charge of the plant by means of pressure-gauges on the operating floor. On the 19th of July, there was such a stoppage; and it was necessary to open the vessels and locate it. His son, Mr. Ernest Cutler, had been sent on that day to Plymouth to see what progress was being made with the work of erecting the new plant, and he was asked to assist in rectifying the stoppage in the original set, which they handed over to the Gas Company last December. The right course to have taken was, after the water-seal of the washer had been removed, to see that the valve between the washer and the scrubber was closed, because, though there was another valve which cut off communication between the scrubber and the gasholder, there would be a small portion of gas remaining in the scrubber; and, for the purpose of safety, the valve between the scrubber and the washer should have been closed. As he understood, this was not done; and the consequence was that, when the cover was removed from the manhole of the scrubber, a draught was caused, which drew the gas in the scrubber back to the top of the superheater, where it ignited, flashed back to the scrubber, and caused an explosion. His son was not a gas manager; but he understood the working of the plant, as did also the man Cole who was assisting in opening up the plant.

Mr. *Ernest Cutler* said he was an engineer, residing at Blackheath, and employed by Messrs. Cutler and Sons. On the 19th of July he arrived at the works of the Plymouth Gas Company in connection with the contract which the firm were carrying out for the erection of new sets of water-gas plant. While there, his attention was drawn to a stoppage in the plant erected last year. It would be indicated by pressure-gauges on the operating floor of the plant. In order to locate a stoppage, the usual process was to open the washer. The first step to be taken was to fill up the washer with water, in order to drive the gas into the scrubber, and to cut off communication between the scrubber and the holder by closing the valve. Then the water would be drawn off from the washer, the valve between that and the seal-cup closed, and the lid of the manhole in the washer removed. He was told at seven o'clock on the evening of the 19th that there was a stoppage. He had been on the works all day, and was about to leave. He instructed Cole, who brought him the information, to flood the washer and take off the lid. At that time he expected to be away an hour; but he returned in about twenty minutes. He saw the water running out of the washer, and thought the operation had been completed. Accordingly he told the deceased and a man named Baverstock to take the lid off the manhole in the scrubber. When this was done, he put his head into the manhole, but withdrew it because some water fell on him. Immediately afterwards the explosion took place, and if he had not withdrawn his head he must have been killed. Deceased, Baverstock, Cole, and another man were near; and all of them were burned. He should not have ordered the manhole cover to be removed if he had not assumed that the valve between the scrubber and the washer was closed. The practical effect of the valve being open was that the gas could travel to the top of the superheater; and the seal of the washer being removed, there was nothing to prevent it lighting-back to the manhole. If the valve had been closed, the accident could not have occurred. Their firm had erected similar plant at Hornsey, Hastings, Southend, Buenos Ayres, and many other places; and there had been no accident prior to this.

By the Jury: The deceased and Baverstock were fitters, and were not practically acquainted with the working of the plant. He did not give any definite instruction to Cole to close the valve, his time and attention being occupied in efforts to locate the stoppage. Cole was conversant with the working of the apparatus, of which he was an operator in the employ of the Gas Company.

The Coroner: It is clear that the Gas Company have nothing to do with this, however.

Mr. Pearce: No; the question of financial responsibility does not arise in this inquiry.

A Juror: If Cole had carried out the orders given to him, the accident would not have happened.

The Coroner: I do not think we have got quite so far as that. No definite instructions were given to him in reference to this valve. It seems to me that the witness and Cole were relying entirely upon each other.

Frank Cole said he was employed by the Plymouth Gas Company as an operator of the water-gas plant. He complained to Mr. Ernest Cutler of the obstruction; and Mr. Cutler, who was about to leave the works, told him to flood the washer by the time he came back. He did this; and on Mr. Cutler's return he informed him that he had done it, and was waiting further instructions. Mr. Cutler then told him to let the water out; and he let it out of the washer alone. After he had done this, there was considerable water in the scrubber, which was sealed. Mr. Cutler then said he was to let the water out of the scrubber; and while he was doing this Mr. Cutler stood by. The water had hardly got out of the scrubber, passing through the washer, and witness was looking round to see that there was no light burning near, when the explosion occurred. He did not see the lid of the manhole removed. Witness's experience of the working of the water-gas plant dated from December last, when the plant was taken over from Messrs. Cutler and Sons.

By the Coroner: They tried on the previous day to remove the obstruction. If Mr. Cutler had not been present, he should have opened up the plant, and tried himself to find the cause of the stoppage.

By Mr. Pearce: He was one of the men instructed by Messrs. Cutler and Sons in the working of the plant. He agreed that the effect of the water-seal was to prevent the gas flowing back; and the water having been let out of the washer, the proper thing was to shut off the valve between it and the scrubber. The only time they performed this operation before was the previous day, when they looked for the obstruction, but did not find it.

Mr. *Russell*, Medical Officer of the South Devon and East Cornwall Hospital, Plymouth, stated that the deceased was admitted on the 19th of July suffering from burns, and died on the 27th of the month from the effect of his injuries.

The Coroner said it seemed unnecessary to prolong the inquiry. There were other witnesses; but they could not throw more light on what had taken place than they already had. The cause of the explosion had been very clearly explained.

A Juror: It was clearly an accident; no one is to blame.

The remainder of the Jury concurred; and a verdict to this effect was returned.

THE QUALITY OF THE GAS AT PORTSMOUTH.

A Large Excess of Ammonia.

According to a local paper, an important report was made to the Finance Committee of the Portsmouth Corporation last Thursday, with reference to the composition of the gas supplied by the Portsea Island Gas Company; and the matter was of such a nature that it was decided to hold a special meeting of the Committee next Thursday to consider it again before reporting to the Council. It appears that the gas contains an unusual quantity of ammonia. For some time past the results of the tests for this chemical have been very good, only very slight traces of it having been found; but rather more than a week ago the test revealed no less than 20 grains of ammonia per 100 feet. As the legal quantity must not exceed 4 grains, the excess is considerable. The Directors of the Company have written to the Committee to the effect that the presence of the ammonia was due to neglect. At the time the letter was written, there was about a million cubic feet of gas in the holders with the excess of ammonia, but efforts were being made to eliminate it. Subsequent tests show that these efforts have been to a certain extent successful; the latest record being 14 grains per 100 feet. The Committee have had the Medical Officer of Health's attention drawn to the matter, with the object of finding out the effect of ammonia upon the health of people living in gas-lighted rooms. It is further stated by our local contemporary that the Company have had a good deal of trouble lately in maintaining their gas free from impurities, which have played havoc with the pipes, especially in some of the northern parts of the town. An expert has been called in by the Company to help them to remedy the state of affairs, which is described as being very bad.

RICHMOND GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on the 25th ult.—Mr. T. J. Carless in the chair.

The Engineer and Secretary (Mr. T. May) having read the notice convening the meeting, the report and accounts were presented. The latter showed that the sale of gas in the six months ending June 30 produced £17,943; and residual products, £4076. The total revenue was £22,083. The expenditure on the manufacture of gas was £12,569; on distribution, £1903; and on management, £1667—the total expenses being £17,237. There was consequently a balance of £4846. The profit and loss account showed a balance of net profit available for distribution of £7137; and the Directors recommended dividends of 5 and 3½ per cent. for the half year.

The Chairman, in moving the adoption of the report, said he had nothing very special to bring before the proprietors. The Company had done a good, steady half-year's work; and he congratulated them on the result shown in the accounts. The capital expenditure in the past six months had been confined to the outdoor department; there being a sum of £206 for new mains chargeable under this head. The works were capable of meeting an increased demand for gas; and it would be seen that the business was in a very healthy condition. Turning to the revenue account, he pointed out that coal had cost £655 more than before. A large number of service mains had been laid; and the whole district was now well supplied. The lighting of the public lamps showed a large increase in amount; the installation of incandescent burners, new lanterns, and the extra work involved in the maintenance of the system being largely responsible for this. The improvement in the lighting of the town would be apparent to all. As regards the receipts, the increase in the sale of gas was another matter for congratulation. Last year it amounted to 12 per cent.; and this year they were able to record a further sale of 3 per cent.—the prepayment department accounting for about half. The number of consumers was still increasing; and gas for cooking purposes was apparently more popular than ever. The prices ruling for coke were lower than they had been for some time past; but the receipts from sulphate of ammonia had been more satisfactory. Passing on to the profit and loss account, there was a balance of £7137, which allowed of the payment of the usual dividend, and left £3156 to be carried forward. In addition to this, they had an invested reserve fund of more than £5000. He thought the proprietors would agree that these figures spoke for themselves.

Mr. Clarke seconded the motion; and it was carried.

A vote of thanks having been passed to the Chairman, he proposed a similar compliment to Mr. May and the other officers for the good work they had done in the half year. The proposition was cordially received, and duly acknowledged.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The shareholders of the Cheltenham Gas Company were informed by the Chairman (Mr. R. Ticehurst) last Thursday that the business of the Company during the past half year had been most satisfactory, and that there had been an increase in the consumption of gas of upwards of 6 million cubic feet as compared with the corresponding period of last year. No new capital had been raised since the previous meeting; but the Directors proposed, before the close of the year, to offer a batch of stock for sale. Coal had been dearer during the year; but satisfactory arrangements had been made with several collieries for a supply. In view of the prospect of increased business, they had purchased a strip of land in the vicinity of the works, which he thought would prove a valuable acquisition. The report and statement of accounts were adopted; and a dividend at the rate of 5 per cent. per annum was declared.

In moving, at the meeting of shareholders on the 25th ult., the adoption of the report, noticed in the "Journal" last week, of the Directors of the Cork Gas Consumers' Company, the Chairman (Mr. G. Lynch) stated that, owing to the reduction made in the price of gas, the rental from the private consumers in the six months ending June 30 was nearly £400 less than in the corresponding period of 1897. This was, he thought, to be expected, as the increase in consumption which invariably followed a reduction in price had not yet had time to make up the deficiency in rental. The Company's prices would now compare favourably with those charged in any other city in the kingdom, taking into account the quantity of gas made and the conditions under which the Company worked. A gentleman who had been erecting some large machinery for a firm in Cork was surprised at the low price charged by the Company for gas for motive power; and he at once recommended that it should be used in preference to electricity, which the parties had intended to employ. It was now twenty years since the great gas scare of 1878, when gas shares fell to par, and it was supposed that they would shortly become valueless; many persons then, as now, speaking of electricity as the "light of the future." Though twenty years had since elapsed, and great improvements had been made in electric lighting, gas still held its own; and, strange to say, the consumption had largely increased in the cities where the light was most extensively used. In fact, in all towns, large and small, almost without an exception, the consumption of gas had increased side by side with the electric light. The inducements held out in Cork to parties to take the electric light looked attractive on paper at first sight; but they would, he believed, prove very disappointing in practice. Consumers would do well to make themselves fully acquainted with the very restrictive conditions under which they would be entitled to the benefit of the reduced prices named after the first two hours. There were 31 cities or towns in the United Kingdom where this system was in use, and in only six of them did the consumers get the benefit of an average consumption of over two hours. Owing to the earlier hours at which the shops closed in Cork, even less would be attainable. In the winter months, the heat of the gas would be missed, and other artificial heating would be required, which would add to the expenses. Some large drapery establishments elsewhere which had electric light had given it up and resumed the use of gas, owing to the way in which their silks, satins, ribbons, &c., became mildewed from damp. When parties came to have experience of electric meters, for the use of which they would have to pay a quarterly rent, they would probably find much more cause to grumble than they did with gas-meters, which the Company supplied free of cost to the consumers. The report was adopted; and a dividend at the rate of 8 per cent. per annum was declared.

The Chairman of the Derby Gas Company (Mr. H. Swingler) was in the happy position, at the meeting of the shareholders last Wednesday, of being able to report increases in all branches of the business. In the first place, he announced that the capital expenditure had been £1322, £850 of which had been expended on stoves and meters, which was satisfactory, as it meant additional consumption. The revenue account also disclosed the satisfactory addition of 7 million cubic feet in the delivery of gas compared with the previous half year, in which an increase was also recorded. The advance was really more than it appeared, because it went on from half year to half year in the face of keen competition with the electric light; but there was an excellent field for both. There had also been a rise in the amount received for residuals; even in sulphate of ammonia there had been a satisfactory increase. A further 336 meters had been fixed; and the quantity of gas supplied through them brought in £600. The supply of gas cookers and fires continued to increase; and these accounted in a great measure for the extra quantity of gas consumed, especially during the summer months. The working expenses were again very satisfactory, and showed the good management of those who had charge of the various departments. The result was that, after paying the dividends, amounting to over £9000, there would be the very creditable balance of more than £3000 to be carried forward to the current half year. The report was adopted; and dividends for the half year at the rate of 10, 7, and 5 per cent. were declared. It was further agreed that the remuneration of the Directors and Auditors should be increased to 900 guineas per annum.

The 127th half-yearly meeting of the Douglas (Isle of Man) Gas Company was held on Monday last week—Mr. J. Kaye in the chair. The report presented by the Directors showed for the six months ending June 30, a net profit of £3685. This was an improvement as compared with the corresponding period of last year, notwithstanding the reduction made in the charge for meter-rents from the 1st of April last. Including the balance brought forward, there was a sum of £5465 available for distribution; and the Directors recommended that it should be disposed of by paying a dividend of 30s. per share (being the same as last year), placing £500 to the reserve fund, and carrying forward the balance. In moving the adoption of the report, the Chairman said he thought the results of the working would give satisfaction to the whole of the shareholders. The sales of gas showed an advance for the half year; and the revenue from coke a proportionate progress. There was also an improvement in sulphate of ammonia; but in tar there had been a considerable decline, and the market price had still further fallen. There had been no exceptional expenditure on the manufacturing plant; but in the distributing plant there had been an extension of a main to keep pace with the growth of the town. Having entered into an arrangement with the Town Council for the lighting of the whole of the town by incandescent burners—the lamps along the front of the bay to be increased in number, and to be provided during the season with triple incandescent burners—and the Directors being desirous of making the lighting of the sea-front especially as effective as possible under the conditions, they deputed the Manager (Mr. C. H. Kay) and himself to visit England in order to ascertain the latest and most efficient methods of gas lighting. They selected the new Welsbach burner; but as they could not get delivery of the number required in time, they reduced the order by one-half, leaving the others the ordinary Welsbach burners. He thought it was generally admitted that the lighting had been a great success. Though not so glaring as the arc electric lamp, it was a most effective and brilliant piece of lighting, especially considering the very moderate cost and the distance apart of some of the lamps; the light being much more equally distributed than would be the case with arc lighting. The Directors in this matter had not dealt with it from a profit point of view, but with a desire, even if at a loss, to make the lighting of the front as effective and attractive as possible. In order to show the efficiency and cost of the new incandescent gas-burner as compared with the incandescent electric light, he might say that a Board of Trade unit of electricity gave a light of from 15 to 16 candle power for 16½ hours at a usual cost of about 6d.; while a 2-feet new incandescent gas-burner would give a light of 50 candles for 50 hours at a cost of less than 4d., charged at the price of gas in Douglas. He thought this knowledge would be reassuring to gas shareholders, as showing that they had not anything serious to fear from the competition of electric light. The report was adopted; and votes of thanks were accorded to the Chairman and Directors, as well as to the Manager and Secretary and the staff.

At the recent half-yearly meeting of the Eastbourne Gas Company, the Directors reported a profit of £5528 on the revenue account for the six months ending June 30; the amount available for distribution being £16,680. They recommended that dividends at the rate of 14½ and 11½ per cent. per annum should be declared. This would absorb £6093, and leave a balance of £10,587 to be carried forward. In moving the adoption of the report, the Chairman (Dr. G. A. Jeffery) stated that the sale of gas in the past half year had increased by 5½ per cent., which, of course, was very satisfactory. The advance had been from 108,133,000 to 114,024,000 cubic feet. The profit was £5528, against £6366 in 1897—a drop of £838. This, on the face of it, looked rather serious; but he thought before he had finished he should be able to show the proprietors that it was not at all a serious affair. Coals had cost £612 more; and residuals had brought a return of £45 more. The net increase in the cost of coal was £566. The expenditure on manufacture was £300 less. Distribution cost £153 more; this being due, largely, to the adoption of coin meters. Rates and taxes in Eastbourne never get less. The Company were, on the present occasion, poorer to the tune of £229 on account of the increase in the rates and taxes. The quantity of gas produced was 119 million cubic feet, against 113 million cubic feet. The price of tar had utterly failed this year. They had a very good make of sulphate of ammonia, and the selling price had advanced. Since the last meeting, the Directors had been supplying coin meters; and there were 750 in use. They were readily sought for, and could hardly be supplied fast enough. Through 500 of these meters already 2 million feet of gas had passed. They had made a great deal more gas, but not quite sufficient profit to pay the dividends recommended. Last year the Directors made a bold experiment in reducing the price of gas 2d. per

1000 cubic feet. This entailed a loss of £1800. This year they had paid £566 more for coals. Moreover, they had lost, through the low price of tar, something like £300. This made a total of some £2666, which had been nearly wiped off by the profits accruing in the past half year. They did not expect cheap coals in the next six months; but he anticipated that they would get an increased amount from residuals. He believed that through the low price of gas they would command a considerably larger consumption than hitherto; so that he hoped when he met the shareholders this time next year to be able to announce a profit capable of paying the full maximum dividends, and possibly to recommend a further reduction in the price of gas. The works were in a most efficient state; and they thought of adding greatly to their capacity. Their staff had, one and all, done everything in their power to earn the dividend; and he was requested by the Directors to return their best thanks to them for their loyalty. Mr. Bennett seconded the motion; and it was carried. A vote of thanks having been accorded to the Chairman and Directors, a similar compliment was paid to the Manager (Mr. J. Hammond) and workmen, as well as to the Secretary (Mr. J. H. Campion Coles). These gentlemen having briefly replied, the proceedings closed.

The annual meeting of the Falmouth Gas Company was held on Thursday last—Mr. R. M. Tweedy, Chairman of the Board of Directors, presiding. In moving the adoption of the report, a summary of which appeared in the "JOURNAL" last week, the Chairman said many things had arisen to prevent them realizing the profit they would like to have made. The increase in the consumption of gas had not been what they expected when they reduced the price. This was a disappointment; but if there had not been a large rise in the price of coal, they would have gone on in the hope that the lower charge for gas would stimulate consumption, although they must have had to make smaller profits for a year or two. But the increase of 3s. 9d. per ton in the price of coal as compared with last year made a difference of 4¼d. per 1000 cubic feet in the cost of gas; and the Directors thought it necessary to raise the price 4d. per 1000 cubic feet. It was gratifying to find that the Corporation had at last consented to fix some incandescent lights in the public lamps; and it was hoped before long the whole of the lamps would be fitted with these burners. They understood the Corporation were very anxious to secure the Company's property for the benefit of the town; and as a gas shareholder, he should be pleased to see it come about. Unless they were very much disappointed, the price the Corporation would have to pay them would quite satisfy all the shareholders. Evidently the Corporation thought they had a little gold mine; but he believed that, if they employed really experienced persons to look into the figures, they would not be so very sweet on taking over the works. Mr. Silverthorne, the expert employed by the Corporation, valued them at £38,750; but the Company did not fall in with his valuation. He was sorry to say a great many people in Falmouth fancied the Corporation were going to get the works at Mr. Silverthorne's valuation (laughter); but, of course, the Company would employ their own valuer. In a recent case elsewhere, the Corporation expert valued the works at less than Mr. Silverthorne's estimate; but the Gas Company wanted double the amount, and went to arbitration. The arbitrator's award was 75 per cent. beyond the Corporation valuer's price, and within a few thousands of what the Gas Company had asked. If they went to arbitration and obtained terms as good as these, the Falmouth Corporation would have to pay the Company considerably over £60,000. In addition to that, working capital would be needed, and officials, perhaps, have to be compensated. These and other things would bring the cost to the Corporation up to about £70,000. Now, 3 per cent. on £60,000 was £1800. Last year the profits of the Company were £1315. Where was the profit to come from for the Corporation? While as a consumer he should be glad to see the Corporation take over the works, as a ratepayer he should be sorry. The motion was carried; and a dividend was declared for the half year, making a total of 13½ per cent. for the year. The Chairman expressed a wish to retire from the directorate; but, at the earnest request of the shareholders, he consented to continue in office for another year. By this time, he said, they would know the intentions of the Corporation. If the works were to be taken over by the town, he would remain on until the matter was settled; if not, he should resign.

The half-yearly general meeting of the Farnworth and Kearsley Gas Company was held on the 25th ult.—Mr. J. W. Watkinson in the chair. The accounts presented showed that in the six months ending June 30 the receipts were £8042, while the expenditure was £5210; leaving a balance of £2832. The amount available for distribution was £5574; and the Directors recommended the payment of dividends at the rate of 10 and 7 per cent. per annum, less income-tax. In moving the adoption of the report and accounts, the Chairman congratulated the shareholders upon the sound financial condition and prospects of the Company. He referred to the fact that few concerns had been able to accumulate so substantial a reserve fund (which now stands at £13,000) in proportion to the amount of share capital issued—£73,474, including £4974 premium. This no doubt accounted for the present high value of the Company's stock and shares. More than 800 automatic meters were in use; and there was still a good demand for them among the working classes. The report was adopted, and the dividends recommended were declared. A hearty vote of thanks was given to the Chairman, Directors, and Auditors. The Chairman, in responding, referred in complimentary terms to the officers of the Company, and concluded by moving a vote of thanks to them. This was acknowledged by the Manager (Mr. T. L. Sheppard) and the Secretary (Mr. W. Bromley).

The report of the Great Marlow Gas Company, which was presented at the recent annual meeting, shows that the Company are considerably enlarging their means of doing business. During the past year, the mains have been extended to Bisham; and satisfactory progress has been made with an extension to Bourne End, the cost of which, with the Provisional Order lately obtained, will amount to about £5000. A dividend at the rate of 7 per cent. per annum for the second half of the year has been declared, making a distribution of 6½ per cent. for the year, as compared with 6 per cent. the previous year.

The report of the Hartlepool Gas and Water Company was summarized in our issue for the 23rd ult.; but some additional particulars were furnished to the shareholders by the Chairman (Mr. W. H. Fisher) at the meeting last Wednesday. He said he was glad to find himself in a position to move the payment of the maximum dividends on the whole of the share capital, and in addition to carry forward a substantial balance. Their customers had also had the benefit of a reduction in the charge for gas, foreshadowed by him at the previous meeting. The revenue for the year was £30,436, against £30,386 in the previous twelve months. The production of gas was 358,811,000 feet, or an increase of 20,115,000 feet, which was equal to 6 per cent. There had also been a very satisfactory demand for prepayment meters; the number now in use being 1879—an increase of 694. The quantity of water supplied for domestic use was upwards of 668 million gallons, or an increase of more than 69 million gallons; while the quantity supplied for all purposes was 1134 million gallons. He referred to the Bill which had passed through Parliament, giving the Company power to borrow money, and to construct much-needed reservoirs for the storage of soft water. He also mentioned the opposition of the West Hartlepool Council to the scheme, and said that, although a lot of money had been spent on both sides, the Corporation had gained nothing more than the Company were prepared to grant if the matter had been discussed between them. The report was adopted.

At the recent half-yearly meeting of the Normanton Gas Company, the Chairman (Mr. E. Mitchell, J.P.), in moving the adoption of the report and accounts, stated that they showed an expenditure on the capital account of £802, part of which was for the extension of the purifying plant, and the remainder for extensions of mains and new meters. The revenue in the six months ending June 30 showed a satisfactory increase from the ordinary and the prepayment meters; the consumption of gas showing 17 per cent. increase on the corresponding half of last year. The residuals had produced a little more; but this was in consequence of the extra coal used. Referring to the unsatisfactory condition of the tar market, he expressed the hope that part of the deficiency would be made up by the better price realized for ammonia, the market for which was in a much better condition than it had been for some time past. In the expenditure, the chief items of note were the increase of coal due to the extra quantity required, and the repairs and maintenance of plant. The latter had been £277 against £62. This large additional outlay was necessary, owing to the renewal of the purifiers. The total income was £2821, and the expenditure £1740; leaving a balance of £1081. Against this was a charge of £60; leaving £1021 as profit for the half year. The balance available for division was £2978. The report was adopted. The Chairman proposed that the recommendation of the Directors for the payment of a dividend for the half year at the rate of 10 per cent. per annum be approved; and this was agreed to.

In the report of the Directors of the Reading Gas Company for the six months ending June 30, they announce a considerable increase in the quantity of gas sold in this period as compared with the first half of 1897. The yearly contracts for coal and for the sale of surplus tar have been entered into—the former at a further advance in price, and the latter at a considerable diminution. These circumstances will somewhat increase the cost of the manufacture of gas during the current year. The accounts accompanying the report show that the sale of 148,531,400 cubic feet of gas inside, and 4,830,000 cubic feet outside the borough, as well as 10,186,258 cubic feet for public lighting, brought in a revenue of £22,932; residuals produced £6354; and the total receipts were £29,341. The expenditure on the manufacture of gas amounted to £18,576, of which £13,179 was for coal; distribution came to £2533; and the total expenses were £24,576—leaving £4765 to go to the profit and loss account. The balance available for distribution was £17,531; and the Directors recommended the payment of the full statutory dividends. Under the supervision of Mr. E. Baker, 15,639 tons of mixed gas coal were carbonized in the six months covered by the report; the residuals produced being: Coke, 15,639 chaldrons; breeze, 199 loads; and tar, 163,481 gallons. The make of sulphate of ammonia was 172 tons.

The 91st half-yearly general meeting of the Stretford Gas Company was held yesterday. The report presented showed a profit, including the balance of £268 brought forward, of £4651; and the Directors recommended the declaration of dividends at the rates of 10, 7½, and 7 per cent. per annum. The quantity of gas made under the supervision of Mr. H. Kendrick, the Company's Engineer, in the six months ending June 30, was 104,035,000 cubic feet, of which 100,501,100 cubic feet were sold, and 698,100 cubic feet used on the works. In the production of the above-named bulk of gas, 6601 tons of coal and 2599 tons of cannel were employed. The cost of coal, including discharging, per 1000 cubic feet of gas sold, was 1s. 3·16d.; and the manufacturing charges, including repairs, 6·87d.—together, 1s. 10·03d. Nearly half the coal and cannel is carted from the railway station, a mile distant; the remainder being delivered by canal alongside the works. The price of gas, which after the current quarter will be reduced 3d., averaged 2s. 9 62d. per 1000 cubic feet. It was lowered by 2d. early in 1896.

The annual meeting of the Sunderland Gas Company was held on Thursday—Mr. James Stokoe presiding. In the course of his address to the shareholders, he stated that during the year 719 new consumers had been added; and there had been an increase of 19 million cubic feet in the gas supplied. In meter-rentals there had been an increase of £1692; and in the residual products, of £1252. The total increase in the revenue was £2943. This would have been very gratifying indeed; but the expenditure had been considerably larger. There had been an increase in wages of £1298; and in coal, lime, and leading of £3374. In rates and taxes there was an advance of £148; in repairs, a decrease of £1654; in salaries and Directors' fees, an increase of £583; and other items made a total increased expenditure of £3377. There was a balance on the year of £17,180. He was able to report that alterations at the Hendon railway siding had now been completed, as well as a new retort-house. This latter was most important, as it was capable of manufacturing, when in full operation, 50 per cent. more gas than was produced at present. There was a very serious increase in the price of coal, which would cost the Company £6000 more this year than last; but still he had no doubt that the Directors would be able to advise the continued payment of a maximum dividend. The report was adopted; and a dividend was declared of 5 per cent. on the original stock, and 4½ per cent. on the additional capital stock.

The half-yearly meeting of the Tonbridge Gas Company was held on Monday last week, under the presidency of Mr. J. Fagg. The Directors recommended dividends at the rates of 11½, 8½, and 5 per cent. per annum. The Chairman, in moving the adoption of the report, referred to the very large increase in the consumption of gas for cooking purposes and also for gas-engines. Owing to this, the size of the mains on the

works had been increased, and new condensers erected. Besides this, a large set of purifiers were in course of construction. The Directors thought the time had arrived for applying for additional powers to enable them to cope with the great increase in business. In seconding the motion, Mr. Lees congratulated the Directors on the highly satisfactory nature of the report, which showed that, notwithstanding a reduction of 2d. per 1000 cubic feet in the heaviest quarter ending March, the balance was £1660, which, added to the balance of £3008 brought forward, made a total of £4668 available for division. The consumption of gas continued to grow very rapidly; the increase for the half year being 4,127,700 cubic feet, or at the rate of 20·2 per cent. The report was adopted; and the dividends recommended were declared. After the ordinary business, a special meeting was held at which it was decided to apply for powers to raise additional capital, extend the limits of supply, and other purposes.

The 59th half-yearly meeting of the Waltham Abbey and Cheshunt Gas Company was held on the 26th ult., at the Company's offices, Waltham Cross. Mr. Alfred Kitt, Assoc.M.Inst.C.E., who presided, in moving the adoption of the Directors' report, noticed in the "JOURNAL" for the 23rd ult., remarked that the finances of the undertaking were in a very satisfactory condition, especially as the Company recently reduced the price of gas by 2d. per 1000 cubic feet. The report was adopted. At the conclusion of the ordinary business, a special meeting was held, at which it was resolved to sanction the issue of £10,000 additional share capital, authorized by the Company's Provisional Order of 1881, also of £3125 debenture capital under the borrowing powers thereby conferred.

The report of the Directors of the Wolverhampton Gas Company, which was noticed in last Tuesday's issue, was submitted to the shareholders at their meeting that day. In commenting upon it, the Chairman (Mr. Henry Ward) said he regretted that it had been deemed advisable to reduce the dividend to the extent of ¼ per cent.; but the Directors hoped to be able to retrieve the diminution before long. A loss of £1044 had been sustained in the sale of coke, tar, and other residuals; and owing to the South Wales coal strike, they had had to pay £817 extra for coal and lime, while the contracts for coal for the whole year had had to be made at higher rates. Compared with the corresponding period of last year, there had been a decrease of £1060 in the sales of gas. The report was adopted. It was subsequently agreed to issue debenture stock to the amount of £12,370 for the purpose of meeting the mortgage charges—the interest to be 3½ per cent.

Water Companies.

Mr. E. Dennis, the Chairman of the Directors, presided at the half-yearly meeting of the Barnstaple Water Company yesterday week, and congratulated the shareholders on the satisfactory nature of the report presented. The disposable balance on revenue account was £1272. Dividends of 10 and 7 per cent. on the two classes of shares were declared, which absorbed £880, and left £392 to be carried forward.

At the ordinary general meeting of the Brymbo Water Company on the 24th ult., the Directors reported that during the year ending June 30 there had been an increase of £41 in the accounts relating to domestic supplies, while the trade supplies had gone up £345. The net revenue was £1928, which was brought up to £1939 by the balance brought from the previous account. Deducting the interim dividend and the interest on debentures and loans—together, £1061—there was a sum of £878 available for dividend. The Directors recommended that this should be at the rate of 3½ per cent. per annum. The Chairman (Sir Theodore Martin, K.C.B.), in moving the adoption of the report, referred to the satisfactory increase in the trade supplies, which he hoped would still further improve. Owing to the Company's prosperity, they might, he said, have declared a 4 per cent. dividend. He alluded to the completion of the Pendines reservoir, which was capable of storing 96 million gallons of water, and had been constructed at the moderate cost of £10,000. The amount the Company had been authorized to raise was not quite sufficient to cover the whole of the cost; and instead of going to their bankers to raise what was necessary, he had put aside £1500 for the Company. They would have to spend money in laying mains, and so forth; and for this it might be necessary to raise an additional £3000 of capital. The report was adopted.

The half-yearly general meeting of the Leatherhead and District Water Company was held on the 23rd ult.—Mr. H. Rokeby Price in the chair. The Directors, in their report, stated that the receipts for the six months ending June 30 amounted to £1750, and the working expenses to £988; leaving a profit of £762, or £107 in excess of that for the corresponding period of 1897. To this had to be added £593, the amount brought from the previous half year; making a total of £1355. Deducting £149 for interest on debenture stock, there remained £1206 available for distribution. The Directors recommended a dividend at the rate of 4 per cent. per annum. This would absorb £599, and leave a balance of £607. The Chairman, in moving the adoption of the report, congratulated the shareholders on having had so satisfactory a half year. There had been no deficiency of water—the wells holding out capitally. The report was adopted, and the dividend declared.

The half-yearly general meeting of the West Surrey Water Company was held on the 30th ult.—Mr. J. M'Millan in the chair. The report of the Directors showed that the income for the six months ending June 30 amounted, after making provision for empty houses, irrecoverable rates, &c., to £4137; and the expenditure to £1710. Comparing the accounts with the corresponding half of 1897, the income shows an increase of £207; and the expenditure an increase of £233. The mains were extended by 1182 yards; and 145 new supplies were connected, representing a future rental of £253 per annum. The Engineer and Manager (Mr. J. K. Hill) reported that the whole of the Company's works were in good order. After transferring from revenue £200 to the contingency fund, the amount available for division was £2657, which the Directors recommended should be applied as follows: In payment of a dividend upon the preference shares amounting to £536; and a dividend at the rate of 5½ per cent. per annum upon the ordinary shares, amounting to £1279—leaving £842 to be carried forward.

Cooking by Gas in Coventry.—According to a report of the Gas Committee of the Coventry Corporation recently issued, the number of cooking-stoves on hire in the city on June 30 last was 2132, as compared with 1915 on the corresponding date last year; being an increase of 217, or equivalent to 11·33 per cent.

ANOTHER STRIKE AT THE LLANELLY GAS-WORKS.

The Town in Darkness.

For the second time within the course of a few months, there is a strike at the Llanelly Gas-Works. The present dispute was brought about by the dismissal, on Monday last week, of the foreman of one of the gangs for an alleged theft of coal, and the appointment, in his place, of the second man in the gang. Thereupon the men raised the old question of seniority; the vacant position being claimed by the brother of the dismissed man, who was in another gang. The Manager (Mr. A. R. Cawley) declined to yield to the demands of the men, whereupon they all went out on strike. Subsequently, however, the Directors gave way on the question of the appointment; and then fresh demands were made which could not be conceded. The result of the strike was that on Thursday night the town was greatly inconvenienced by a number of lamps in streets outside the centre of the town not being lighted at all; and during the night operations at the gas-works ceased. On Friday morning the Directors of the Gas Company notified to the Borough Council, the Great Western Railway Company, the Post Office, and the officials of all the public institutions, that no lamps would be lighted; and private consumers were informed that the supply of gas would be completely cut off. Having regard to the great inconvenience and danger in the town as a result of the proposed action of the Company, a special meeting of the Borough Council was convened, for the purpose of devising means by which the strikers could be replaced; and Mr. G. Watkeys, the Surveyor, was instructed to confer with the Manager, and offer him the labourers in the employ of the Council. Mr. Cawley courteously thanked the Council, and readily accepted the men offered. Later in the day the men were approached on the matter, but all refused to go to stoke at the gas-works under the circumstances; and the town was in total darkness. An attempt was made to obtain stokers from outside; and as soon as this became known, a large number of men and boys wended their way to the station. In the meantime, two arrived, and were met at the station by the Manager, and were driven to the works gates without the slightest disturbance. The police took possession of the works and the surroundings with commendable promptitude. The local Secretary of the Gas Workers' Union (Mr. Morgan) remained at the railway station all night with the object of handing the men, if they came, a circular instructing them that a strike is pending. It is reported that a large number of claims for damages have been sent in to the Company by tradesmen and works managers in the town who could not get sufficient pressure of gas for motive power, with the result that in fitting shops, printing offices, carpenters' shops, and all other places where gas-engines are in use, business was seriously interfered with. The Company's labourers and lamplighters refused to take the place of the stokers; and they were discharged. We learn by telegram that the works are now manned by non-unionists; and the town will be lighted this evening.

At the Llanelly Police Court, on Friday, the dismissed foreman, Theophilus Richards, was charged with stealing a pennyworth of coal, the property of the Gas Company. A police-constable deposed that he saw defendant with a lump of coal early on the morning of the 28th of August. He admitted taking it from the gas-works. Another constable gave similar evidence. Mr. Cawley deposed that defendant was in the employ of the Company as foreman stoker, and that he should have been on the premises at the time he was stopped by the police officer. He admitted, in cross-examination, that he had had some unpleasantness with defendant—in fact, he had not been able to get on with any of the men. Defendant pleaded "Not guilty," and asked to be tried before a Jury at the Carmarthen Assizes. The Bench acceded to the request.

LEEDS CORPORATION GAS SUPPLY.

The Price of Gas—The Annual Accounts.

The Gas Committee of the Leeds Corporation had a long discussion last Wednesday on the question of reducing the price of gas, which is now 2s. 2d. per 1000 cubic feet; and it was resolved that a special meeting should be convened to consider the whole matter. It appears that several points weighed strongly with members in favour of a reduction. One was the satisfactory progress reported by the General Manager of the gas-works (Mr. R. H. Townsley). Another was the fact that, in the course of a month or two, it will be possible, by means of the new appliances at the Meadow Lane works, to produce no less than 2¾ million cubic feet of gas per day. The quantity of gas made and sold per ton of coal carbonized during the first six months of the present year, is the largest known in the history of the undertaking. From every ton of coal, 10,412 cubic feet of gas were produced, and 9303 cubic feet sold. In the corresponding period of last year, the average amount sold was only 8862 cubic feet per ton of coal carbonized. An encouraging feature is that the rate of progress has been well maintained during the two months that have elapsed since this return was made up.

The draft report on the working of the department during the financial year ended March 25 last was also submitted to the Committee, and was approved. Owing to the awkwardness of the Lady-day date, many of the statistics supplied are for the year ended June 30. For instance, during the period named the quantity of gas sold reached the total of 2,573,691,000 cubic feet, or 40,694,100 cubic feet more than the previous year—an increase of 1·6 per cent. Yet the amount of coal and cannel carbonized was 1033 tons less than in the year ended June 30, 1897—a decrease of 0·36 per cent. The gas made measured 2,849,233,475 cubic feet—an increase of 36,769,717 cubic feet upon the year 1897, or 1·30 per cent. The gas sold per ton of coal amounted to 9152 cubic feet, compared with 8974 cubic feet the year before; and the gas made to 10,132 cubic feet, as against 9965 cubic feet in 1897. New mains to the extent of 19,122 yards were laid during the year; 6057 new meters were fixed; and 7779 meters were exchanged. Meters repaired numbered 6694; the cost varying from 5s. 11½d. to 6s. 0¾d. per meter, as compared with 6s. 3d. and 7s. 1¼d. the previous year. A resolution of the Committee to have all meters brought in and tested once in ten years is, by the way, now being carried out. The use of gas-engines and gas-stoves, it appears, is growing. There were 723 engines in use in 1897, and 805 in the year just ended, or an increase of 82. Gas-stoves are more numerous by 322; and prepayment stoves, introduced during the past twelve months to the number of 272, are rapidly advancing in favour. Prepayment meters, too, continue

to attract attention; and the number in use has increased from 1500 to 3200. From these particular sources, it is interesting to know, an income of close upon £3000 has been realized.

The revenue account shows a net profit of £24,359 on the year's trading. From this, the sum of £12,127 has been deducted for sinking-fund purposes; leaving a surplus sufficient to increase the reserve to £31,258. The sinking fund in March last amounted to £300,280; and of this £130,412 has been applied to the repayment of debt. The amount invested and ultimately to be applied in the redemption of debt is £169,867. Compared with the previous year, the income from the sale of residuals, &c., has increased by £6175. Expenditure has decreased by £3061 in wages, purification, and repairs; and has increased, so far as the cost of coal is concerned, by £4137. Large additions have, of course, been made to capital account to effect the improvements now noticeable at the several works. The amount of increase, in round figures, is £61,840, which includes £21,000 on the new retort-house, £3501 on coal-stores, £4000 on a purifying-house, £2982 on washers, £1131 on stoking machinery and other extensions at Meadow Lane, £8183 on extensions at the York Street works, £5292 on gas-stoves, and £4481 on meters. The average illuminating power of the gas, as shown by the Corporation tests, is 18·25 candles; and according to the City Analyst, 18·18 candles.

GAS-WORKS EXTENSIONS AT NELSON.

Major-General Crozier last Tuesday inquired into an application by the Nelson Town Council for the sanction of the Local Government Board to the borrowing of £40,000 for gas-works extensions. The Town Clerk (Mr. R. Prescott) explained that the old Local Board acquired the gas undertaking in 1866; and owing to the growing wants of the district, the Brierfield Gas-Works were purchased for £20,000 in 1888. The statutory limits of supply were increased; and the £40,000 then applied for was for the development of the Brierfield works, which were better situated than those at Nelson. Alderman Wilkinson, the Chairman of the Gas Committee, stated that some of the money applied for had been expended; and an open borrowing clause had been obtained in respect of the gas undertaking. The annual output of gas was 190 million cubic feet, as compared with 6 millions thirty years ago. The storage capacity was equal to 2½ million cubic feet. The price of gas was 2s. 6d. per 1000 cubic feet in the borough, and 2s. 9d. outside. Mr. Pickover, a ratepayer, objected to the proposed expenditure. He thought the rates were getting too high, and that the debt of the borough was too large. He asked what the liability of the borough was; and if the proposed expenditure would lessen the price of gas, which, he contended, was more than it was in a great many towns in Lancashire. In reply, he was told that the rates were 2d. in the pound less than they were four years ago; that the outstanding debt, under the Public Health Act, was £101,505; and that the price of gas was less than it was in most Lancashire towns.

THE PUBLIC LIGHTING OF SALISBURY.

Gas versus Electric Light.

The Salisbury Town Council, at their meeting last Thursday, considered estimates from the Gas Company and the Electric Light Company respectively for the lighting of the City. The Electric Light Company submitted a scheme which, when compared with the cost of lighting during the past few years, showed a slight saving. But Mr. Norton H. Humphrys, the Manager of the Gas Company, sent in a scheme comprising the replacement of the present No. 5 flat-flame burners with No. 2 Welsbach (new pattern) burners, and No. 4 Welsbachs at the principal crossings, open spaces, &c., that afforded four times as much light for little more than half the cost. The Mayor, in commenting on the tenders, corrected several errors in the Electric Light Company's scheme, and pointed out that it would really cost more than the system at present in use. The Gas Company's scheme represented a saving of £341 per annum; and so he thought there was only one course to take. The offer of the Gas Company was accepted unanimously; but several of the members appeared to think that the reduced price was simply due to the pressure of competition, and did not recognize the fact that the new burners proposed to be used will not consume half as much gas as the flat-flame burners.

THE PAST AND PRESENT GAS SUPPLY OF BIRMINGHAM.

It is interesting to record the fact, says the "Birmingham Daily Post," that this is the centenary anniversary of the time when William Murdoch first applied gas lighting for illuminating purposes, on an extensive scale, in Birmingham. Murdoch was the inventor of gas-lighting, and thus became the founder of one of our most useful industries. He was a great public benefactor—how great can only be adequately appreciated by our oldest citizens, who can remember the days when tallow chandlers abounded, when the rushlight was the principal illuminant within the economic means of the working classes, and when gas was an expensive luxury. Those times have happily changed; and now gas is not only rapidly superseding oil and the wick in the humblest households, but more powerful illumination by electricity is gradually taking the place of gas in public buildings and prominent business establishments. What a difference has been effected in the lighting of Birmingham during the past hundred years! The manufacture of coal gas in these days may be similar to that carried on by Murdoch; but the methods of producing it have been immeasurably improved. Man's ingenuity has given us superior buildings, better appliances, improved machinery; and we enjoy the advantage of a more brilliant light at a cost of which our forefathers could not possibly have dreamed.

The first use of gas in London was in 1807, and the first gas company established was in the Metropolis in 1810. Birmingham, strange to say, was very slow to move in the same direction; but private use was made of the invention by several persons. In 1817, Mr. John Gostling erected gas-works, and laid pipes for the supply of gas by agreement with the Street Commissioners and with private consumers. The first shop lighted was Pulteney's, at the corner of Moor Street, in 1818; but the streets were not lighted by gas until April 19, 1826. In 1819, Mr. Gostling's business was converted into a company, under the name of the Birmingham Gas Company; and in 1825, the Birmingham and Staffordshire Gas Company was established—the former supplying the town only, while the latter extended its area almost to Wolverhampton. These two Companies remained in existence until 1875, when the undertakings were purchased by the Corporation on behalf of the town. Curiously enough, there are no available records which would enable a comparison to be made of the quantity of gas manufactured and distributed by the Corporation and by the old Companies; but the prices charged are an eloquent testimony to the advantages we enjoy now as compared with the time of our forefathers. From 1819 to 1825, two methods of charging the consumers were adopted—by contract and by meter indication. At first the number of consumers was small; and, according to their agreements, they were expected to turn out their lights within ten minutes of the time specified in the contracts, except on Saturday nights, when they were allowed an extra hour. Argand burners were used, and those who burned gas from dusk until nine o'clock at night were charged £3 10s. per annum if their burners had 16 holes; but if they only had 12 holes, the price was £2 12s. per annum. If the gas was not extinguished until ten o'clock, the prices were £4 10s. and £3 8s. respectively; eleven o'clock, £5 10s. and £4 4s.; and twelve o'clock, £6 10s. and £5. This scale was in respect to six days a week; but if the seventh day was contracted for, the prices were proportionately higher. When the meter system was solely adopted, the consumption was the more easily checked, and the scale of charges was altered. In 1825, the price was 15s. per 1000 cubic feet, less 5 per cent. discount for prompt payment; but it was subsequently reduced to 12s., and in 1834 to 10s. per 1000 cubic feet. In 1837, a scale was introduced whereby the consumers of less than 5000 cubic feet of gas paid 9s. 2d.; less than 25,000 cubic feet, 8s. 4d.; less than 75,000 cubic feet, 7s. 6d.; and above this quantity, 6s. 8d.—a discount of 7½ per cent. being allowed in each case. As years rolled by, the scale was frequently revised, invariably in favour of the consumer. In 1850, the price varied between 5s. 6d. per 1000 cubic feet for a consumption under 10,000 cubic feet, and 3s. 6d. for a consumption of 200,000 cubic feet and upwards; the discount being 5 per cent. In 1873, the price was 2s. 7d. for a consumption of 25,000 cubic feet and under, and 2s. 3d. where the consumption reached 100,000 cubic feet. Then, in consequence of the prosperity of the times, higher wages, and dearer coal, the price was slightly raised; and when in 1875 the Corporation acquired the undertaking, the charges ranged from 3s. to 3s. 6d. per 1000 cubic feet, with a discount of 5 per cent. The next year the price was reduced 3d.; and other reductions were subsequently effected until 1887, when the scale ranged between 2s. 3d. and 2s. 7d.—prices ruling to-day.

Though it is not possible to compare the development of the undertaking under the Corporation with the business done by the old Companies, the growth of the Gas Department will be apparent by contrasting the first year under municipal government with that which expired in March last. In 1875, the bulk of coal carbonized was 296,000 tons, but last year it had risen to 509,481 tons; and whereas the quantity of gas sold and used in 1875 was, in round figures, 2327 million cubic feet, last year the total had reached the enormous amount of 5074 millions. The surplus profit in 1875 was £25,339; and last year, £50,336.

END OF THE SOUTH WALES COAL STRIKE.

The Terms of Settlement.

A joint conference of the South Wales Coalowners' Emergency Committee and the Workmen's Provisional Committee was held at Cardiff last Thursday; this being the time limit of the employers' ultimatum issued on the previous Saturday. The men at their meeting on Wednesday virtually decided, by 61,912 votes against 37,077, to accept the masters' terms. The members of the Workmen's Provisional Committee arrived at Cardiff early in the day, and held a private consultation under the presidency of Mr. W. Abraham, M.P. The Owners' Emergency Committee also held a separate conference—Sir W. T. Lewis presiding. Soon after eleven o'clock, the two sides met, and the subject of the monthly holiday was first debated. The owners adhered to their refusal to sanction the continuance of the holiday; and eventually "Mabon," on behalf of the workmen, offered to forego it conditionally upon a play week being granted once a year in summer. The owners declined to accept this. Sir W. T. Lewis was particularly emphatic on the point; declaring that the holidays must be abolished, as they had entailed great loss and inconvenience to the employers in the past. About four o'clock in the afternoon, a decision was arrived at, and an agreement was signed by eleven of the men's representatives to return to work, on the masters' terms, on and from Sept. 1. Interviewed at the close of the conference, "Mabon," in a message to the miners, said the day had ended with terrible disappointment for all of them. It had been a fearful fight all day. They must accept the inevitable, and prepare to organize for better things. All that could possibly be obtained had been secured. Mr. P. D. Rees, one of the Workmen's Committee, who seceded, intimated that he had refused to sign the agreement because, in his opinion, the terms offered by the owners were not a whit better than those against which the men came out five months ago. The 12½ per cent. was no minimum at all. His advice to the workmen of South Wales was to organize as soon as possible, and then join in a strong body the Miners' Federation.

Late on Thursday night, official reports of the proceedings were issued. The owners' version stated that it had been agreed that work should be resumed at the associated collieries on and from Sept. 1 upon the following terms: (1) The terms and conditions of the sliding-scale agreement (known as the "old scale"), which terminated upon March 31 last, shall, together with clause 3 of the agreement of Feb. 17, 1893, be embodied in an agreement, which shall continue in force until the 1st day of January, 1903, and may be determined by six months' notice on either side, to be given on July 1, 1902, Jan. 1, 1903, or any other following July 1 or Jan. 1. (2) The monthly holiday known as "Mabon's day" shall be abolished, and no other holiday of a like nature will be permitted. (3) The wages payable up to Nov. 30, 1898, shall be 17½ per cent. above the standard of December, 1879. (4) An audit of the selling prices shall be taken for the two months ending Oct. 31, 1898, to regulate wages as from

Dec. 1, 1898, in accordance with clause 12 of the 1892 agreement. (5) If after the 1st day of September, 1898, the employers, by the very nature of this agreement, reduce the wages of the workmen below 12½ per cent. above the standard of December, 1879, the workmen shall have the right of giving six months' notice to terminate this agreement on the 1st day of any January or July next ensuing, notwithstanding the first clause of this agreement. The workmen's official report stated that the Employers' Emergency Committee agreed that all the workmen should be reinstated in their former employment as far and as soon as practicable. At a special meeting of the Coalowners' Association, the agreement was unanimously ratified. General satisfaction was expressed at the termination of the dispute, and at the resumption of friendly relations with the men.

ELECTRIC LIGHTING NOTES.

It is reported that the Local Government Board have declined to sanction the borrowing by the Bury St. Edmund's Corporation of £20,000 for an electric lighting installation. It will be remembered that the application to the Board was strongly opposed by many ratepayers at the recent inquiry.

The Barnsley Town Council last Tuesday sanctioned an increase from £23,322 to £25,000 in the amount to be borrowed for the carrying out of the proposed electric lighting scheme. Remarking upon the suggested increase, the Mayor (Alderman Wray) said it was "believed" that they would be able to construct the works according to the estimates; but it would be unwise to apply to the Local Government Board for the exact sum they would want.

We learn from the "Electrician" that the municipal installation of electric lighting in Brussels comprised on the 31st of December last three stations, of a total power of 1650 kilowatts. The total length of streets was 40 kilometres, an increase of 22·6 per cent., with a development of cables of 226 kilometres. The number of consumers was 739. The number of lamps installed, reduced to units of 16 candles, was 47,391 (an increase of 28 8 per cent.), or a mean of 117 lamps per metre run of main. In this number are included, according to their value in units of 16 candles, 770 arc lamps and 28 motors. The maximum output during the year 1897, up to Dec. 23, was 8765 ampères, corresponding to about 17,530 16-candle lamps working simultaneously, or 37 per cent. of the number of lamps installed. The net profit was 222,411 frs. (£8896), or 4 per cent. on the cost of first establishment.

In the minutes submitted by the Electric Lighting Committee at the meeting of the Bury Town Council last Thursday was a report by the Borough and Electrical Engineers as to the manner in which the electric light undertaking had increased its scope. The report showed that while in March, 1897, 41 consumers used 2481 lamps, in August of this year 101 consumers had in use 6788 lamps. To the latter figures must be added a further 1725 lamps for which applications have already been received; making a total of 8513, and leaving a balance of 1487 to make up the full complement of 10,000 8-candle power lamps—the estimated total capacity of the present plant. The borrowing powers—£30,000—were almost exhausted, as there had been expended up to the end of July last above £28,000; while authority had been given to spend another £4000 on mains. The Committee had resolved that plans and estimates for an extension of the plant should be prepared, and that the Town Clerk should make application to the Local Government Board for power to borrow £20,000 to carry out the necessary works. The minutes were confirmed.

In their anxiety to secure at the earliest possible moment all the advantages attributed to electric lighting, the Redditch District Council have commenced the construction of works before obtaining the consent of the Local Government Board to the borrowing of the necessary loan. Their application for permission to borrow £11,000 for the installation, and £2500 for the land required, only came under the consideration of Mr. R. H. Bicknell, one of the Board's Inspectors, last Wednesday; and he felt it his duty to inform the Council that, by their premature action, they ran a very serious risk of not having the loan granted. It was submitted in support of the scheme that for a long time it had been felt that the public lighting ought to be in the hands of the Local Authority; but this was not practicable with gas, under existing conditions. The quality of the gas for many years had not been of the best; and the average price had been 4s. per 1000 cubic feet. The population of the district had largely increased of late; and, as the result of a canvass of the town, promises to take more than 3000 lamps had been made. It was also believed that electricity would be largely used by manufacturers for motor purposes.

Petersfield, in Hampshire, is not a very large, and possibly not a very wealthy, place; but a certain section—apparently a small one—of the worthy inhabitants appear to be anxious to spend their money on an electric lighting scheme. The District Council last June called in Mr. A. H. Preece, whose report recently came before the Council at what is reported to have been one of the longest meetings on record. The document had been previously considered by the Lighting Committee, who recommended, in accordance with the advice of the Engineer, the Council to proceed for a Provisional Order; and the Vice-Chairman (Mr. Cross), who is pushing the electric light question, gave notice that, at the meeting of the Council on the 22nd inst., he would move the adoption of this recommendation. The number of public lamps in the town is 91; and Mr. Preece suggests that they should be replaced by 4 arc lamps of 1000-candle power, 45 glow lamps of 32-candle, and 30 of 16-candle power; while with regard to private lighting, he thinks it would be sufficient to allow for 1000 lamps of 8-candle power fixed, with about 750 burning at one time. He reckons for a capital outlay of £3750, an annual income of £811, and an expenditure of £783—leaving a balance of £28. The income includes £500 for private lighting, which he says is only one-third of the present income of the Gas Company from private consumers; but he thinks there can be no doubt that, in many of the new houses now being erected, a large supply of electric light will be required. The estimated income is based on a charge of 7d. per unit, or, as Mr. Preece originally put it, "equivalent to gas at 4s. per 1000 cubic feet," as compared with the winter charge of 5s. at Petersfield. The 4s., however, was subsequently stated to be a clerical error for 4s. 8d.; and it appears that since 1895 the winter charge for gas has been 4s. 6d. Gas, therefore, has the advantage on the score of price. Comparing gas and electricity light for light, Mr. Preece says an ordinary 5-feet burner gives, as a rule, 12-candle power, and therefore 1000 cubic feet of gas will afford 2400-candle power. A unit of electricity will give 300-candle power in ordinary electric lamps, and 8 units will thus furnish 2400-candle power. The report was very sharply criticized by Mr. Burley, who pointed out the absurdity of taking 12 candles as the light-giving power of a 5-feet burner, whereas the minimum was 14 candles, and the usual quality of gas in Petersfield 16 candles. He informed his fellow members of the Council that, by putting on an incandescent burner, they would obtain from the 5 cubic feet of gas from 60 to 100 candle power—a very different thing from 12 candles. Mr. Preece took electricity at 7d. per unit in order to compare it, price for price, with gas as he assumes it to be at Petersfield. But even if they compared it with incandescent light, which would be at least double, they would get electricity compared with gas at 8s. or 9s.; or, to take it in another way, the price of gas at Petersfield would be half the cost of electric light on his basis. How, he asked, did Mr. Preece get 7d. per unit? He threw in £500 as income from private consumers. He (Mr. Burley) thought they could not, as reasonable beings, expect such a large income; it was absurd on the face of it. If the Council were going in for providing the electric light for private consumers, they had no right to spend the ratepayers' money in such a direction unless they could make sure of a return; and he contended that the balance-sheet showed that they would make a loss. Was it on account of street lighting? If so, he maintained that they were not justified in proceeding with it until they had asked the Gas Company if they were prepared, light for light, to supply the town at the same or a less cost than Mr. Preece showed electric light could be provided for. The Gas Company had endeavoured to meet the Council in every possible way, and had offered to hand over the whole thing to them, and supply gas at the low rate of 3s. 9d. per 1000 cubic feet, in order that the town, through its representatives, might have entire control of the lighting—the Council simply taking the lanterns and columns at a valuation. He trusted they would pause before embarking on this great outlay. We cannot follow Mr. Burley in his criticism of the various weak points in Mr. Preece's report. Suffice it to say that he made out a very good case against the projected scheme; and he has held his ground in the newspaper correspondence which has followed his able defence of gas at the meeting of the District Council. Why, it may well be asked, should Petersfield wish to sink money in an electric light undertaking on such a balance-sheet as the one presented, when they have at hand the means of improving the public lighting, if they wish to do so, by the aid of incandescent gas-burners? If they were urged on by a clamouring crowd imperatively demanding the electric light, matters would be different. But this is not the case. The project does not appear to be very cordially regarded by the ratepayers, for they are pretty generally signing a petition to the Council against it. Mr. Burley, at the recent meeting of that body, reminded the members that the question of gas *versus* electricity had been gone into thoroughly by the Winchester Town Council, who had decided in favour of gas; and we may add that, as will be seen from a report which appears in another part of the "Journal," the Salisbury Town Council have unanimously accepted the scheme for public lighting submitted to them by Mr. Norton H. Humphrys, the Gas Company's Engineer, in competition with the Electric Light Company. The examples of Winchester and Salisbury may be safely commended to the District Council of Petersfield.

COAL IN THE EAST.

In view of the fact that the East, and especially the Far East, has for some little time been a subject of special attention by Europeans, to say nothing of the inhabitants of the Colonies and the great American continent, the following article, reproduced from "Engineering," dealing with the East as a coal supplier, may not be without interest to our readers:—

It is almost a commonplace to say that the production of coal and iron in any country determines the position of that country among the countries of the world. Probably in the future, as we become more acquainted with the forces of Nature, this may not be true to the same extent as it has been in the past; but we may rest assured that for many a day a cheap supply of coal and iron will be the most important factor in determining the extent and importance of the industrial operations in any part of the globe. If any proof were wanted in support of this opinion, it would be supplied by a recent report of the Board of Trade. The figures therein given show us that other nations, and notably the United States of America, are pressing us very hard in supplying coal to those nations which require it, and may, indeed, be able to import it into Britain at a price which would enable it to compete with British coal. The average value of coal at the pit's mouth in the United States for the year 1896 was only 4s. 9¼d., whereas in the United Kingdom it was 5s. 10¼d. The latter, of course, has the advantage in shipping facilities; but these figures are sufficient to show us that in the future we must expect severe competition in our coal trade from the United States. Probably the majority of those who are interested in the subject, or even have studied it from a statistical point of view, will admit the truth of what has been said about the United States, for the facts are well known and cannot be denied; but comparatively few, as yet, recognize the extent and amount of the competition in the coal trade which is growing up in other parts of the world. We recently showed that the Germans have been able to displace us in many of the European markets which we formerly supplied; but meantime we do not propose to make a general survey of the whole subject, but only to glance at the question of coal supply in the East, and consider how it is likely to affect industry and trade, and our relations to them.

Of all the countries in the East, Japan is the one which has attracted most attention on account of its industrial development and the probability of competition with British manufactures. But it does not seem likely ever to become a very important factor in coal production, because so far as is known, the coal deposits are not very extensive, and a great part of what is produced will be used up in the industries of the country. In 1883, the total production of coal in Japan was a little more than

1,000,000 tons, while in 1895 it was nearly 5,000,000 tons. The average market value at the first of these dates was 8s. 8d., while at the latter it had decreased to 5s. Within the past year or so, the price has considerably increased on account of the demand for home and foreign use. In 1883, the amount of coal exported from Japan was 390,000 tons, whereas in 1896 it had increased to 2,194,000 tons, chiefly, we understand, to China, Korea, Hong Kong, Burmah, the Philippine Islands, and California. The amount of British coal imported into Japan in 1883 was 9000 tons, whereas in 1896 it had risen to 49,000 tons, confined almost entirely to Welsh steam coal. Directly, therefore, the increase in the production of coal in Japan has not affected the British coal trade with that country; but indirectly the amount exported has, in many parts of the Far East, practically extinguished it. Moreover, when the coal deposits of Formosa, which are said to be considerable, have been developed, the competition from the Japanese will be greatly increased. Last year about 10,000 tons of coal were produced in Formosa. But that is only a fraction of the possible output; and we may rest assured that the Japanese do not intend any of the natural resources of Formosa to lie idle.

The coal production of China has hitherto been so insignificant that it is treated as a quantity which may be neglected in the report of the Board of Trade. The coal resources of China, however, appear to be immense, and if the one which we recently mentioned be a fair specimen, it is evident that China is destined to become a great industrial country. That one coalfield alone is said to be sufficient to supply the world, at the present rate of consumption, for more than 2000 years. It is certain that the Syndicate which has obtained such a valuable concession will waste little time in making the most of it. Indeed, it is already reported that the same Syndicate has obtained another concession in the province of Ho Nan to work the coal and iron mines in that region for a period of sixty years. The concession includes the right to construct the necessary connecting railways with the works to be undertaken by the same Syndicate in the province of Shan-si. It is stated on good authority that coal is found in every province in China; and when railways are constructed, the abundant cheap labour of the country will be attracted to the new industry, which, with all its attendant results, is certain to bring about many changes in the commerce and social conditions of China.

The Russians have now got hold of the resources of Manchuria, and when the Trans-Siberian Railway and its connecting lines have been completed, there will be an immense industrial development in that part of the world. Some time ago, an Imperial Russian Commission investigated the coal deposits along the line of that railway; and they reported that they had discovered upwards of fifty groups of workable coal seams. Their results have been confirmed by an American Commission sent out to investigate the subject; for the Americans are not by any means content with the vast resources of their own country, but seem to have their eyes on all quarters of the globe. With the development of the resources of Manchuria and of the Yangtze Valley, it is impossible to form any idea of the industrial and commercial changes which are likely to take place.

British India is rapidly increasing her production of coal. In 1883, it was 1,315,976 tons; while in 1896, it had reached 3,848,013 tons. The quantity of coal imported into India in 1883 was 712,900 tons; whereas in 1896, it had decreased to 494,960 tons. On the other hand, 136,719 tons were exported from India in 1896; so that it is safe to say that in a comparatively short time India will practically have ceased to buy coal from us. Indian coal is said to be specially adapted for steam raising; and some of it is reported to be as good as Welsh coal for this purpose. There is also a possibility of French Indo-China coming into direct competition with the coal of India in some of the Eastern markets. But the resources of that country are small compared with China proper; and capitalists are certain to put their money into coalfields which offer the best prospects.

The supplies of coal from Japan, British India, and China must cause the trade in coal between Australasia and the Far East to diminish, and ultimately to disappear; and already the competition is becoming very keen, so that the coal trade in the British colonies is exposed to the same difficulties as those which beset the mother country. In a recent article, containing a summary of the report of the Board of Trade, the "Statist" gave the following table showing the present annual coal-producing capacity of the Pacific and the Far East:—

	Tons.
British India	4,500,000
Japan	5,000,000
Australasia	6,000,000
China, Formosa, Indo-China, Dutch East Indies, Borneo, and Eastern Siberia	4,250,000
British Columbia	1,000,000
Chili	500,000
Natal and Transvaal (whose outputs are available for the Indian Ocean)	1,750,000
Total	23,000,000
Exports from the United Kingdom to east of the Cape of Good Hope and west of Cape Horn	1,700,000
Grand total of consumption	24,700,000

Or (say) 25,000,000 tons.

Of this amount about 50 per cent. comes from British possessions; but when the sources of supply we have mentioned are developed, it is probable that the proportions may be very much changed, and, moreover, that not only will the demand for British coal be diminished in the countries of the Far East, but also that the competition in the other markets of the world will be intensified. This possibility should be carefully remembered by all concerned.

Advance in the Price of Coke.—A Yorkshire paper reports that there is almost a coal famine in Staffordshire. This time last year, our contemporary remarks, gas coke was a drug; but now it is scarcely to be obtained at any price. The cause is understood to be the great activity in the district industries, combined with the Welsh strike. A marked advance has taken place in prices. While contract rates are 8s. 6d. to 9s. per ton, quotations for current deliveries have increased to 12s., and may go still higher. Blast-furnace coke has advanced to 15s. and 16s.; and foundry, to 18s. to 20s.

THE DRY WEATHER AND THE WATER SUPPLY.

The Curtailment of the Supply at the East-End.

Continuing our record of the most noteworthy events, as far as readers of the "JOURNAL" are concerned, in what is persistently called, by a certain section of the Press, the "Water Famine" at the East-end of London, the first matter to be noticed is the inspection of the East London Water Company's reservoirs by the General Purposes Committee of the Hackney Vestry on the afternoon of the 27th ult. Permission to do this had been readily accorded by the Company; and about twenty members of the Vestry availed themselves of the opportunity of personally ascertaining the exact state of affairs.

They were first of all conducted over several of the Company's extensive reservoirs by Mr. J. V. Jeffree, the Resident Engineer. Roughly speaking, the reservoirs and works of the Company cover the whole of the eastern bank of the River Lea from Clapton to Tottenham—a distance of more than two miles; while the width averages half a mile. In this area the Company have nine reservoirs capable of storing 12,000 million gallons of water, the actual water area of the reservoirs being 280 acres. Mr. Jeffree first conducted the party to the Lower Maynard reservoir, near the Ferry Boat Inn, Walthamstow. The first stop was made at the culvert through which the water obtained from the wells at Waltham and from the upper reaches of the Lea passes from the upper to the lower reservoirs. The depth of the water flowing through this culvert was not more than 9 inches; but it was said that when the reservoir is full the depth is 25 feet. Mr. G. Chambers, the ex-Chairman of the Hackney Vestry, measured the distance of the water from the bank of the reservoir, and said it was 60 feet. It was stated that the depth of the water then in the reservoir averaged 4 feet; but the appearance of great banks of weeds in the centre indicated that the bottom was not far off. The reservoir was practically empty. On the west side of this reservoir, Mr. Jeffree pointed out the open aqueduct belonging to the Company which brings water from the Lea direct to the filter-beds. The stream in this aqueduct seemed to be practically dried up; but Mr. Jeffree said it brought down several million gallons of water a day. Continuing the walk, the party soon reached the Upper Maynard reservoir, at the head of which the water for storage is received. The culvert here was all exposed to view, and the water was falling from the apron over the rough stone ledges to the bed of the reservoir. The insignificance of the quantity coming in was disheartening to those who are feeling the pinch of the present scarcity. Returning to the starting-point, the party were conducted to other reservoirs on the Walthamstow marshes; but these were practically in the same state of emptiness, for the water was far below the culverts, and the bottom was exposed in the very centre. The most depleted in appearance was the largest of the new Warwick reservoirs, which were added a year or two ago. Here the bottom was exposed for acres; but Mr. Jeffree accounted for this by saying that the ballast had been unequally laid, and that the water-level of all the reservoirs was practically speaking the same.

One fact impressed the whole of the party—namely, that while the Company possess ample storage accommodation, they are unable to find water enough to fill the reservoirs. Mr. J. W. Whiter suggested to Mr. Jeffree that the Company should seek other sources of supply. Mr. Jeffree replied that they were now engaged in sinking wells; and he took the party to a spot where one was being sunk into the chalk about 200 feet below the surface. The well was not more than half completed, but it was yielding a million gallons of water a day. Some distance farther on the party were conducted over a completed well and engine-house. Here two engines raise between them 4 million gallons daily. Five million gallons are thus raised every day on the Company's own land. These two wells are only part of a scheme which is being carried out; the ground being tunnelled in all directions from a winding shaft, at the top of which the roar of rushing water 200 feet beneath could be distinctly heard. At this point rain, which had been falling in slight showers during the afternoon, came down in torrents; and it was decided to bring the visit to a close. Mr. Whiter, as Chairman of the Committee, thanked Mr. Jeffree for the courtesy he had displayed in showing the members over the works, and expressed a hope that the rain would continue, and put an end to the scarcity of water. On the way to the station at Walthamstow, the party saw the Racecourse reservoir and its companion on the other side of Copper Mill Lane—probably the two largest reservoirs the Company possess—and both were in the same depleted condition as the others. The heavy rain was very welcome in East London, and gave the sewers a much-needed flushing. The quantity which fell, however, had no appreciable effect on the stream in the River Lea; the ground being too parched to allow much water to find its way into the river.

The foregoing description shows the effect of the drought on the River Lea. It may be interesting, in connection with it, to give a few figures as to the nature and extent of that drought, furnished by Mr. G. J. Symons, F.R.S., the eminent meteorologist, which are quoted by the Special Correspondent of "The Times" who is investigating this question. And here it must be acknowledged that the leading journal is showing, as on previous occasions, its desire to present to its readers, and place on record for all time, a true and faithful account of the present difficulty. Mr. Symons shows that the rainfall recorded at his house in Camden Square for the past eleven months has been 15·31 inches, as compared with 23·57 inches, the average for the past ten years; being a deficit of 8·26 inches. At Broxbourne the deficit has been 8·41 inches; and at Southgate, 9·61 inches. The effect on the Lea is shown by the following figures, giving, in millions of gallons, the daily flow in each month in the past two years:—

	1897-8.	1896-7.		1897-8.	1896-7.
Sept.	35	77	March	36	276
Oct.	28	143	April	23	126
Nov.	25	91	May	28	82
Dec.	35	255	June	23	76
Jan.	48	195	July	15	45
Feb.	26	302	Aug.	10–12	29

"Could anything," asks "The Times" Correspondent, "be more eloquent

than these columns?" He compares them with the two previous years of scarcity:—

	1895.	1896.	1898.
April	63	52	23
May	44	28	28
June	24	22	23
July	26	18	15
Aug. . . .	End of drought	17	10–12

These figures seem to the compiler to show that "the Lea can no longer be relied upon as the principal asset in the East London Company's resources, and that consequently the calculations on which the Royal Commission based its finding must be reconsidered." The figures include the water brought from the New River Company. The writer referred to thinks the only hope—apart from copious rains—is that they may be able to spare a little more before long or that assistance from elsewhere may become feasible. And this is the situation in which consumers are deliberately wasting water in order to compel the Company to resume the constant service. He asks: "Can folly and wickedness go further?"

While on the subject of the cause of the present scarcity of water, let us hear what an authority on underground water supplies has to say on the matter. Writing to "The Times" last Tuesday, Professor Boyd Dawkins said: "In the present excited state of public opinion, caused by the want of water in the East-end, it will not be inopportune to review the facts as they are presented, without prejudice, to an outsider. It is so much easier to throw the blame on the East London Water Company than to go further and inquire into the reasons of the failure, that the public bodies interested have, with scarcely an exception, adopted the former course. The facts are these: The exceptional deficiency of rainfall, not merely during the last twelve months, but following an equally exceptional series of dry years, hitherto unknown in the annals of water supply, is the main cause of the deficiency. This deficiency has been aggravated by the abnormal heat of the last month, which has caused increased evaporation from the reservoirs and surface streams generally. It is obviously unfair to expect the East London Water Company to have anticipated this combination of circumstances, because they have never before come within the limits of engineering experience. It is difficult to see how any public body such as the Railway and Canal Commissioners, or even the London County Council, could have foreseen and guarded against meteorological conditions unknown up to that time. Under the circumstances, it was absolutely necessary to diminish the supply of water through the mains in the interest of everybody in the district. Looking at these exceptional conditions, it seems to the writer, after a study of London Water Supply for thirty years, little less than a miracle that the Water Company should be able to provide as much as 25 gallons per head (26 gallons on Aug. 24)—a quantity that is found sufficient for daily use in many other places, and that certainly does not imply anything of the nature of a 'water famine.' This is really due to the absence of the means of storing water among the poorer classes, who allow it to flow through their midst and largely to waste. With the provision of these, the water famine will cease. They are now being provided as fast as possible by the Water Company and the various Local Authorities. What more could be done? There is an important lesson to be learnt from this difficulty with regard to the future relating to an increased supply and increased facilities for distribution. The New River and Kent Water Works Companies have come to the aid of the East London Company by passing on to them their surplus water. The first of these is supplied largely, the second entirely, with water from deep wells in the chalk, in which the storage of water is so vast that the yield is not materially affected even by the existing drought. The last is dependent mainly upon surface waters, and draws upon the chalk water only to a limited degree. The large supply from the deep wells of the first two stands in striking contrast to the want of water of the last Company. It justifies the conclusion of the Royal Commission on Water Supply of 1893, that there is a large quantity of water in the chalk available for the future supply of London. It is obviously desirable, further, in the interest of the consumers, that the mains of the various Water Companies should be linked together, as in the case of the above three Companies, so that the surplus water of one may be used to supply the deficiency of another." This suggestion of effecting connections between the mains of the Companies was under the consideration of the Official Water Examiner for the Metropolis (Major-General Scott) and the Local Government Board early last week; and negotiations were on foot to carry it into effect. General Scott and Dr. Bruce Low have been in the affected district every day since the first curtailment of the supply.

Resuming the general record of the progress of events, the first meeting of the Joint Committee of the General Purposes and the Public Health Committees of the Hackney Vestry, which is charged with the duty of seeing that the public are put to as little inconvenience as possible during the present short supply of water, was held on Monday last week at the Hackney Town Hall—Mr. Whiter presiding. It was reported that the East London Water Company had sent a large supply of jars on the previous morning, and that the distribution had been continued throughout Sunday and up to eight o'clock on the following evening. During Sunday and Monday, 36,000 gallons of water had been supplied in the water-vans belonging to the Vestry, together with 1326 jars. A Joint Sub-Committee was appointed to carry out the Vestry's reference. After a long discussion, it was decided to invite each Local Authority served by the Company to appoint six delegates to attend a conference on the subject of the water supply for East London, to be held at the Hackney Town Hall on Sept. 15. The Solicitor reported that the complaint to be lodged with the Railway Commission was nearly ready for presentation. He was asked when the matter would be heard; and he replied that he was afraid the procedure would be a long and tedious one.

On Tuesday evening, a meeting was held in the Great Assembly Hall, Mile End, for the purpose of protesting against the action of the Water Company. Mr. Stuart, M.P., was in the chair. Among the letters read was one from Mr. F. N. Charrington, who hoped the meeting would "insist on the Government compelling the Company to avail themselves of the help of other Companies." Mr. Buxton, M.P., said the whole water supply of London should be under one representative body. The Government should be forced (in accordance with their repeated pledges) to deal with the London Water Question next session. Meanwhile, it was to be hoped that if the Company applied for the full water-rate where they had not supplied the water, their demands would be met with a refusal. The Chairman said that for five years the East of London had almost yearly been destitute of water, because the Company would not exercise the power of purchasing it. The mains of other Companies formed a network all over London, and it was easy to connect them. If the Company liked to sacrifice a small portion of their dividends, they might easily connect themselves at twenty or thirty points with other Companies. Either at the Isle of Dogs or at Woolwich the Company could, at a small expense, connect themselves with the Kent Water Company, and by this means get an additional supply of 3 or 4 million gallons of water a day. The New River Company could give them more water than they did if they were connected with other Companies who had a surplus; and the Chelsea Company had 10 million gallons to spare, if they would only go to the expense to get it. The Company ought to be compelled by Act of Parliament to make such connections. There was a wider question at the bottom of all, and that was the independence of the Water Companies of any supervising authority. What they required was that they should be under the supervision of one central authority. If this were done, it would be an impossibility to have a dearth in any one part of the Metropolis; and until it was done, they would never see the water properly distributed. London's voice would be heard on this matter; and they must take care that the Government did not forget the water question. The following resolution was passed: "That this mass meeting of inhabitants of East London emphatically protests against the arbitrary action of the East London Water-Works Company in again reducing the supply of water to over a million people; thus causing not only a serious inconvenience, but grave danger to life and health." It was also resolved—"That, in the opinion of this meeting, it is of absolute necessity that the water supply of London should cease to be dealt with by monopolists, and at once placed in the hands of the London County Council, as representing the people of London."

A satisfactory arrangement which will materially help the Water Company in their present difficulty was completed on Tuesday. At six o'clock on the evening of that day, the New River Company increased by 2 million gallons the bulk of water allowed by them to flow down the River Lea to the intake of the East London Company; bringing up the quantity thus furnished to 6 million gallons. Furthermore, an agreement has been come to with the Southwark and Vauxhall Company for a connection with their mains by means of a 20-inch pipe to be laid, with the sanction of the General Hydraulic Power Company, in the Tower Subway. This, when completed, will be capable of delivering 5 million gallons of water daily; and it is understood that a district on the north side of the river will be isolated, and supplied entirely from this source. The pipe will be taken down a vertical shaft 58 feet deep, then turned at right angles, carried 1400 feet along the subway, and then up the shaft at the other end.

The President of the Local Government Board (Mr. Chaplin) arrived in London on Wednesday, and was engaged throughout the day at the offices of the Board. The Official Water Examiner reported on the state of the water supply at the East-end; and subsequently the following letter was sent to the Secretary of the Water Company by Mr. H. C. Munro, one of the Assistant-Secretaries of the Board:—

Sir,—I am directed by the Local Government Board to state that the President has had before him this morning the report of Major-General Scott, R.E., to the Board, referring to the steps which are being taken by the Directors of the East London Water Company with a view to obtaining a supply of water for their district from other Metropolitan Companies.

The Board have learnt with satisfaction that a connection has already been effected with the pipe system of the Kent Company through the Blackwall Tunnel, and that arrangements are in progress for connecting the system of the East London Company with that of the Southwark and Vauxhall Company through the Thames Subway, by which means it appears that a supply will be obtained from the reservoirs of the latter Company for use in the East London district.

General Scott has also informed the Board that the Directors of the New River Company are willing to receive water into their district from the Grand Junction Company, by means of a pipe connection suggested by their Engineer, with the object of releasing an additional quantity of Lea water for the use of the East London Company's district. General Scott reports that this project is quite feasible, and that it is very important that, as one means of increasing the supply which is urgently required, it should be carried out at the earliest possible moment.

The Board are aware of the additional storage works which are now in contemplation by the Company; but, having regard to the time which must elapse before such storage can be provided, it is urgently necessary, apart from the serious emergency which has now arisen, that every possible means of increasing the supply, at least in the meantime, should be adopted.

The Board feel assured that the Directors will realize the necessity for the adoption of the scheme referred to as one means of increasing the supply of the Company; and they trust that the necessary arrangements for the purpose may be made forthwith, so that the works may be completed as speedily as possible.

The Joint Committee of the General Purposes and Public Health Committees of the Hackney Vestry met at the Town Hall, and arrangements were made for meeting a further curtailment of the supply which was expected to be announced. During the day 200 jars were supplied and 24,900 gallons of water distributed. Six of the water-vans were employed until ten o'clock at night. A circular was ordered to be sent to the Clerks of the various Local Authorities in East London, inviting them to appoint representatives at a conference to be held on the 15th inst., "to take into consideration the failure of the East London Water-Works Company to fulfil their statutory obligations."

Last Thursday, owing to the continued absence of rain, the Directors of the East London Water Company were compelled to announce that, as from the following Saturday, the hours of supply would have to be reduced from three to two in the morning and afternoon respectively; bringing down the period during which the water would be on from six to four hours in the day. In making the announcement, the Company's Secretary (Mr. I. A. Crookenden) expressed, at the desire of the Directors, the earnest hope that the various Local Authorities would see the necessity of at once discontinuing road watering, inasmuch as the great draught of water for this purpose so reduced the pressure as to prevent the higher cisterns being reached during the two periods of daily supply. The Directors deeply regretted this necessity, but there was no help for it, owing to the unexampled deficiency of rainfall; and they left it with the authorities to use their great influence in their district to caution the

consumers, and prevent in every possible way misuse and waste of water which unhappily exist to a very large extent. A communication was addressed to all the Sanitary Authorities within the Company's limits of supply by Sir Hugh Owen, K.C.B., the Secretary to the Local Government Board, in the following terms: "I am directed by the Local Government Board to state that, from the information which they have received, they have no doubt that, notwithstanding the deficiency of water which unfortunately exists in the district of the East London Water Company, there is a large waste of water in the district; the waste being in some cases wilful, and in others the result of carelessness. The Board deem it right to draw special attention to the matter; and they feel sure that, in the interest of the public health, apart from any other consideration, the Local Authorities will assist, as far as possible, in impressing upon the water consumers the urgent necessity for avoiding all waste of water under the circumstances which at present exist in the district."

In addition to the auxiliary supply from the New River Company, and the promised supply from the Southwark and Vauxhall Company, the Directors of the East London Company last Thursday instructed their Engineer to proceed to carry out a suggestion made by the Local Government Board to effect a connection between the Grand Junction Company's mains and those of the New River Company, so that the latter Company may pass down to the East London Company, through their Lea intake, the quantity of water equivalent to that which the Grand Junction Company can supply to them. The East London Company hope to get another 4 million gallons a day by this means. The figures issued by the Company showed that during the first three days of the week 105 million gallons of water had been pumped into the district, or at the rate of from 25 to 26 gallons per head per day. To supply this quantity, the Company drew on their reserve for about 12 million gallons.

Last Friday, Mr. Crookenden addressed to Sir Hugh Owen the following letter in reply to the communication sent from the Local Government Board on Wednesday:—

Sir,—I submitted to my Directors yesterday your letter of the 31st ult., in which you were kind enough to express your appreciation of the efforts being made by the Directors to obtain auxiliary supplies of water during the present unexampled drought. The Directors have instructed their Engineer to immediately confer with the Grand Junction and New River authorities, with a view of forming a connection between those Companies, and thus enable the New River Company to release for this Company's use a quantity of water equivalent to that which the Grand Junction may be able to supply to them. As explained to General Scott, there appeared to be engineering difficulties; but it is hoped that they can be overcome. In any event, the suggestion will be pushed forward with all possible speed, and the Directors hope with practical success.

I am to assure you that the Directors meet very frequently, and that no effort is spared to obtain in any and every possible way help from other sources.

I may be permitted to take this opportunity of expressing what I am quite sure my Directors feel—namely, their high appreciation of the valuable intimation which your Department have conveyed to the Local Authorities as to arresting the existing and deplorable waste which takes place. Having regard to the quantity of water which is now pumped into the district per head per day—namely, about 26½ gallons—it is manifest that, with ordinary care, no inconvenience even would arise to the consumers in this Company's district. There is, of course, as is well known, the deplorable want of storage cisterns in the great majority of the tenements supplied. But it is hoped that this state of things may, before another season approaches, be remedied; and in the meantime the Directors have ordered an unlimited supply of vessels to temporarily meet this neglect on the part of landlords.

I handed your representative yesterday a copy of the notice [enclosed] restricting the service of water to two hours in the morning and two hours in the afternoon. The Directors deem this absolutely necessary, having regard to the comparatively large consumption and loss of water which is still taking place.

You may rest assured that no effort will be spared in meeting the present state of things in the best available manner.

The Special Water Committee of the Hackney Vestry met at the Hackney Town Hall on Friday night to consider the letter of the Water Company announcing the further restriction of the supply, and the communication from the Local Government Board on the alleged waste. Mr. J. W. Whiter presided. Numerous complaints of total failure of supply were reported. On the consideration of the Local Government Board's letter, Mr. Whiter said the Committee received it with great surprise. They regarded it as a scandalous libel on the people of East London, and thought the Board should know better than to suggest that the people who were so much in need of water would waste it; and this, too, in the face of the assurance of Mr. Bryan to the Vestry deputation that the Company had no ground for complaining of waste. It was decided to write to the Local Government Board to this effect.

The recent great heat caused a water panic in Paris far more alarming than that in East London, because less immediately open to remedy. The daily allowance of water to each individual of the population in other great cities, according to the statistics of a Parisian contemporary, stands as follows: Constantinople, 15 litres (1 litre = 1·76 pints); Berlin, 70 litres; Vienna, 104 litres; London, 173 litres; St. Petersburg, 182 litres; Madrid and Buda-Pesth, 200 litres; Chicago, 636 litres. The daily allowance per head in Paris is 220 litres—96 litres for drinking, and 124 litres for washing, cooking, or other purposes. But this is the allowance "on paper," when the water-works are up to the mark, and the great filter-beds are supplied with the good, but somewhat warm, drinking-water of the Marne and the Dhuis. As mentioned last week, the Parisian has had to be put upon Seine water.

Two at least of the London evening papers—the "St. James's Gazette" and the "Pall Mall Gazette"—have set a good example to their contemporaries by sending a Special Commissioner to investigate the facts in connection with the so-called water famine at the East-end before heaping abuse upon the Water Company. Last Tuesday the correspondent of the latter paper published the results of his "look round" the famine-striken districts. He said: "From what I have seen of the streets in the East-end—and my wanderings have led me through Poplar, Stepney, and the network of humble streets bordering on the Mile End Road—I am convinced that the reports of the 'famine' are alarmist and exaggerated. The stand-pipes are at frequent intervals, and seem to be attended to with regularity. The small number of people who take

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 538.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 15	10½	Alliance & Dublin 10 p. c.	224—234	..	4 9 4
100,000	10	,,	7½	Do. 7 p. c.	164—174	..	4 5 9
300,000	100	July 1	5	Australian 5 p. c. Db. .	105—107	..	4 13 6
200,000	5	May 26	6	Bombay, Ltd. . . .	6¾—7	+¼	4 5 9
40,000	5	,,	6	Do. New, £4 paid .	4¾—5	..	4 16 0
880,000	Stk.	Aug. 12	12	Brentford Consolidated	275—280	..	4 5 9
240,000	,,	,,	9	Do. New . . .	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Prf.. .	140—145	..	3 9 0
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130—135	..	2 19 3
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig..	268—273	..	4 4 3
226,320	,,	,,	8½	Do. A. Ord. Stk. .	195—200	..	4 5 0
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max.. .	125—130*	+½	3 16 11
420,000	20	Ma . 30	11½	British	53—54	..	4 3 4
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c. .	25—27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c. .	20—22	..	3 17 3
500,000	10	Apl. 29	6	Buenos Ayres (New) Ltd	9—9¼	..	6 6 4
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd. . . .	29—30	..	5 10 0
100,000	10	June 10	7	Cape Town & Dis., Ltd.	15—16	..	4 7 6
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stk.	Apl. 15	13½	Commercial Old Stock .	315—325	..	4 3 1
200,750	,,	,,	10½	Do. New do. . .	252—257	..	4 1 8
200,750	,,	June 10	4½	Do. 4½ p. c. Db. do.	148—153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207—212	..	5 13 2
200,000	,,	,,	9	Do. 7 p. c. Prf. .	197—202	..	4 9 1
51,600	Stk	Aug. 31	14	Croydon A 10 p. c. . .	305—310*	+3	4 10 4
168,400	,,	,,	11	Do. B 7 p. c. . .	255—265*	+5½	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125—130	..	4 0 9
60,000	,,	,,	5	Do. 5 p. c. Prf. .	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd. . . .	23—24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid .	16¼—17½	..	4 14 4
5,922,280	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord	290—295	−2	4 3 0
100,000	,,	,,	4	Do. B, 4 p. c. max. .	120—125	..	3 4 0
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	305—310	..	3 4 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf. .	152—157	..	3 3 8
60,000	,,	,,	7½	Do. G, 7½ p. c. do. .	230—240	..	3 2 6
1,300,000	,,	,,	7	Do. H, 7 p. c. max. .	195—200	+2	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf. .	305—310	..	3 4 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf. .	182—187	..	3 4 2
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk. .	131—133	..	3 0 2
294,850	,,	,,	4½	Do. 4½ p. c. do. .	148—153	..	2 18 10
958,000	,,	,,	6	Do. 6 p. c. do. .	198—203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	13¾—14½	..	5 10 4
3,800,000	Stk.	,,	10	Imperial Continental .	212—217	+2	4 12 2
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk. ,,	101—104	..	3 7 4
660,000	100	Apl. 1	5	Met. of Mel- } 5 p. c. Db.	111—113	..	4 8 10
250,000	100	,,	4½	bourne } 4½ p. c. Db.	107—109	..	4 2 7

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	June 29	6	Malta & Medn., Ltd. .	4¾—5¼	..	5 14 3
541,920	20	June 10	5	Monte Video, Ltd. . .	14—15	..	6 13 4
617,946	Stk.	Aug. 31	9¾	Newc'tle & Gateshd Con.	230—240*	+2	4 1 3
252,355	Stk.	Jan. 3	8½	Do. 8½ p. c. Db. Stk.	113—117	..	3 19 10
150,000	5	May 26	8	Oriental, Ltd. . . .	7¼—7¾	+¼	5 3 3
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾—7	+¼	5 2 11
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1¾	+¼	4 11 5
60,000	5	Mar. 11	7	Ottoman, Ltd. . . .	5—5½	..	6 6 2
500,000	100	June 1	6	People's Gas } 2nd M. of Chicago } Bd. .	103—108	..	5 11 1
848,070	10	May 26	6	River Plate Ord.. . .	9—9½	..	6 6 4
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	99—101	+1	3 19 3
250,000	10	Apl. 29	10	San Paulo, Ltd. . . .	15—16	..	6 5 0
125,000	Stk.	Mar. 30	10	Sheffield A.	247—250	..	4 0 0
209,058	,,	,,	10	Do. B.	247—250	..	4 0 0
447,427	,,	,,	10	Do. C.	247—250	..	4 0 0
5,600,000	Stk.	Aug. 12	5½	South Metrop., 4 p.c. Ord.	140—143	..	3 14 7
1,460,000	,,	July 14	3	Do. 3 p. c. Db. Stk. .	101—104	..	2 17 8
60,000	Stk.	Aug. 31	12	Tottenham and } A. .	280—290*	+1	4 2 9
60,000	,,	,,	9	Edmonton } B. .	200—215*	−½	4 5 9
182,380	10	June 10	7	Tuscan, Ltd.	10¼—11½	−1	6 1 9
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red. .	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313—318	..	3 6 0
150,000	,,	,,	5	Do. 5 p. c. Prf. . . .	170—175	..	2 17 2
160,000	,,	,,	4½	Do. 4½ p. c. Pf. Stk., 1875	148—152	..	2 19 3
175,785	,,	Mar. 30	4½	Do. 4½ p. c. Db. Stk. .	157—162	..	2 15 7
1,720,560	Stk.	Apl. 15	8	East London, Ord. . .	320—325	−2	3 11 1
654,740	,,	June 29	4½	Do. 4½ p. c. Db. Stk.	157—160	..	2 16 3
390,000	,,	,,	3	Do. 3 p. c. Db. Stk..	103—105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115—118	..	3 3 7
310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	142—147	..	2 14 5
708,000	Stk.	Aug. 12	14	Kent	364—369	..	3 15 11
160,000	,,	,,	7	Do. New, 7 p. c. max..	213—217	..	3 4 6
1,043,800	100	June 29	10	Lambeth, 10 p. c. max. .	298—303	..	3 6 0
406,200	100	,,	7½	Do. 7½ p. c. max. .	227—232	..	3 4 8
350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
500,000	100	Aug. 12	13½	New River, New Shares	427—432	+2	3 1 4
1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	140—145	..	2 15 2
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	166—171	..	3 10 2
126,500	100	,,	6	Do. do. 7½ p. c. max. .	157—162	..	3 14 1
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf. .	168—172	..	2 18 2
1,019,585	,,	Apl. 15	4	Do. 4 p. c. A Db. Stk.	141—144	..	2 15 7
1,155,066	Stk.	June 10	10	West Middlesex . . .	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162—165	..	2 14 7
200,000	,,	Mar. 11	3	Do. 3 p. c. Db. Stk.	104—106	..	2 16 7

* Ex div.

advantage of them during the hours of their usefulness strikes one as altogether out of proportion to the eager crush of a people stricken by famine. When the water is first turned on, there is a knot of women and children placidly waiting their turn; but after the first few minutes, it melts away almost as soon as the turncock has hurried round the corner. Between three a 1 . four o'clock, I stood by a stand-pipe for nearly a quarter of an hour. The only person who paid it a visit was a small child, who filled a miniature jug, and spilled most of its contents before she had reached her destination. This, it is true, was during the quiet hours of the afternoon, when most of the population are at work away from home. But, even so, it did not look like famine. Nor could any one of the several people of whom I inquired with respectful sympathy give me a single instance of genuine distress directly due to lack of water that had come within their own experience. They grumbled, of course, and very naturally. When you pay water-rates for a constant supply, and do not get it, and yet have to pay, you naturally feel aggrieved. East and West are at one on this point. But as for a single instance of distress occasioned by lack of water not due to negligence, it was not be had for the most sympathetic pumping. Indeed, one or two people hinted, in the course of confidential gossip, that a good deal of water was still being wasted. Aggrieved householders, who meant to 'take it out of the Company' turned their taps on the first thing in the morning, and neglected to turn them off for the rest of the day. How many gallons of water a single tap can waste in the course of six hours let experts work out. Certainly more than people who felt the pinch of need would care to fritter away." The writer concluded by saying: "Whatever the faults and failings of the East London Water Company may be, there seems to be little doubt that the public exasperation against it is stimulated artificially. There are plenty of ward politicians and parochial mugwumps in the East-end who have any quantity of promissory notes, issued at election time, out against them. They have promised the municipalization of everything, from tramways to water-works; and a Water Company's calamity is the mugwumps' opportunity." The following observations were made in the editorial columns on the following day: "By this time, we should think, most people will be convinced of the shallowness of the agitation against the East London Water Company. We hold no brief for that Company or any other, but we prefer the facts of our impartial Commissioner, which we published yesterday, to any number of flabby speeches from street-corner agitators; and these facts show that the outcry against the Company is quite unjustifiable. The supply of water has been—very prudently, we think—kept within the resources of the Company. The agitation against the East London Company is only sincere in its insincerity."

The Public Lighting Question at Downham Market.—Reference has already been made in the "JOURNAL" to the dispute between the Downham Market Gas Company and the District Council in regard to the charge for the public lamps. It seems that something like a crisis has been reached—negotiations between the parties having been broken off. Steps are being taken by the Council to light the town by oil.

THE DEVONPORT CORPORATION AND THE WATER-WORKS.

After considering the matter for several months, the Water Committee of the Devonport Town Council have come to the conclusion that authority should be sought for the compulsory purchase of the undertaking of the Devonport Water Company. In the first place, the Committee entered into negotiations with the Company, and, on the advice of Mr. J. Diggle, invited them to transfer the works to the Corporation on the following terms: (1) The purchase to be completed and possession of the undertaking to be given to the Corporation on the 30th of September, 1899. (2) The consideration for the purchase to be the payment by the Corporation to the shareholders in the Company of annuities commencing from Sept. 30, 1899, such annuities to be equivalent to the dividends now paid on various classes of shares, *plus* one-half per cent. on the paid-up capital for each of the first two years, and a further half per cent. for each of the second and subsequent two years until such annuities shall be equal to the maximum dividends payable on the various classes of shares, but so that no annuity in any particular class of shares shall at any time exceed the maximum dividends payable in respect of that class of shares. (3) The said annuities to be redeemable by the Corporation on the expiration of 60 years at 33⅓ years' purchase. (4) Officers of the Company to be compensated. (5) Costs to be paid by the Corporation. (6) The sale to be subject to the approval of the Town Council, and of the Local Government Board or Parliament, as the case may be. (7) Pending completion of the sale, no capital to be expended by the Company without the consent of the Corporation. The answer of the Company was that they were not willing to sell; and the Committee consequently advised the Corporation to promote a Bill in Parliament next session for the compulsory purchase of the works. Their recommendation will be considered by the Town Council at a special meeting this week.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The last of the series of deputations which the Edinburgh and Leith Gas Commissioners have sent out this year to inspect gas-works, in view of the erection of their new works at Granton, left Edinburgh on Monday morning. It consisted of Bailie Kinloch Anderson, who is Convener of the Works Committee, Sir Andrew M'Donald, Bailie Manclark, of Leith, Councillor Mallinson, of Edinburgh, and Mr. W. R. Herring, the Gas Engineer. The three former deputations perambulated England, and had a look in at a London works before returning home. This last one has gone farther afield. On Monday night, they crossed from Harwich to the Continent. The towns on their list are Copenhagen, Berlin, Vienna, Paris, and Brussels. This method of educating Commissioners is a somewhat costly one at first; but it is the one which is best calculated to lead to saving in the end. It is therefore the best. Hitherto no

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objection has been taken to it; but I should not be surprised if some of the Commissioners who court notoriety should lift up their voices—for speaking's sake—when the accounts of expenses come up for sanction. It will be a pleasing feature of the arrangements for these new works if no such exception be taken. Hitherto there has been unanimity within the Commission. It will be a pity if a jarring note should be now introduced, upon a matter of detail. The Commissioners have a very large undertaking before them. They are at present forming the die upon which their policy for many a day will be moulded. A few hundred pounds spent now will be as nothing compared with the advantage to be gained by making a correct start. Parsimony at this stage of the proceedings might lead to a false step, with resultant yearly loss. This would be false economy. As will be observed from the advertisement columns of the "JOURNAL," the Commissioners are inviting tenders for the construction of a large gasholder tank at Granton. This will be the first part of the work to be settled; but most probably it will not be the first to be completed, for a section of the works will be put in hand as soon as possible. On the return of the deputation, therefore, the Commissioners will have before them the important work of finally fixing the systems or processes to be adopted in the new works.

The Gas Committee of the Aberdeen Corporation on Tuesday considered the estimates prepared by Mr. A. Smith, their Engineer, for the working of the gas undertaking during the current year. These show an expected revenue of £69,066 from the sale of 448 million cubic feet of gas; £5000 from the sale of coke; £5100 from the sale of tar and ammoniacal liquor; and £400 from the sale of cyanogen—a total of £79,566. To this has to be added £5864 of surplus from former years, making a total revenue of £85,430. The expenditure is estimated as follows: Coal £38,500; purifying material, £900; salaries, wages, &c., £10,222; distribution of gas, £2630; maintenance of works and plant, £3800; rents, feu-duties, and taxes, £4086; management (municipal), £2060; discounts and bad debts, £2900; sinking and contingent funds, £8357; annuities, £4770; interest, £3100; reserve and fire insurance funds, £300—a total of £81,625. There will thus be a surplus, it is estimated, of £3805. The finances of the department are in such a satisfactory position that the Committee considered they would have been justified in recommending a reduction in the price of gas of 3d. per 1000 cubic feet; but they have, for this year, contented themselves with recommending a reduction of 1d., making the price 3s. 1d. per 1000 cubic feet. When Mr. Johnston became the Convener of the Gas Committee, in 1894, the price of gas was 3s. 11d. per 1000 cubic feet. In the course of four years, therefore, a reduction of 10d. has been effected, which is highly creditable to all concerned. The Aberdeen Corporation Gas Department is on as satisfactory a basis as any that I know of.

The Perth Gas Commission on Monday discussed at length the report of their Sub-Committee upon the account of Mr. Young, architect, which was given in the "JOURNAL" a fortnight ago. In opposition to the motion for adopting the report, it was moved that the last paragraph—that which proposed to censure Bailie Wright, the Convener, and Mr. A. Wilson, the Engineer—should be omitted. In the vote, fifteen supported the adoption of the report, four the amendment, and four declined to take part in the division. In Mr. Wilson's case there was the further caution that, "in the event of his being guilty of any similar laxity, or showing any want of proper attention and zeal in the discharge of his duties as Manager in future, he will be requested to tender his resignation."

At a meeting of the Directors of the Cupar (Fifeshire) Gas Company on Tuesday, a letter was submitted from Bailie Watson, on behalf of the Corporation, asking if the Directors would name a price at which the shareholders would sell their undertaking to the Corporation. The Directors were of opinion that the Company were not anxious to sell, but that in any event they would require to consult the shareholders before they would name a price. They also thought the Town Council should come forward and make the offer. It was eventually resolved to decline to state a figure.

On Thursday of last week a deputation of the Directors of the Motherwell Gas Company visited Arbroath, for the purpose of inspecting the residual plant which Mr. Carlow erected there three years ago; the Contractors being Messrs. Pettigrew and Co., of Middlesbrough. The whole plant was in operation at the time, and was fully explained to the visitors by Mr. Carlow. A sample of the naphtha produced was tested in their presence, showing the percentage of benzol in it. The deputation expressed themselves thoroughly satisfied with the whole condition and arrangements of the Arbroath Gas-Works.

During the past year, the Airdrie and Coatbridge Water Company had, from their existing works, a surplus revenue of £8783, and paid dividends at the rate of 10, 6, and 5 per cent. upon the respective stocks. In their annual report, the Directors stated that the construction of the reservoir and relative works in connection with the augmentation of the water supply, at Cowgill, near Biggar, was being pushed on. The main-pipes had been laid as far as Symington; and between that place and Roughrigg the pipes and the laying of them had been contracted for. These contracts amounted to about £50,000; and it was expected that between £10,000 and £20,000 would be required to complete the storage reservoir and other works at Cowgill. The Directors hoped that the whole of the new works, with the exception of the compensation reservoir, would be completed by the end of 1899. In the existing works, serving 106,205 households, there was a supply for 102 days, which was 40 days less than last summer. The Airdrie and Coatbridge Company's is the largest and most important water supply undertaking in Scotland not connected with one of the big cities.

Heavy rains have fallen in Scotland this week; and consequently any fears of a scarcity of water have, for this season, been dispelled. The record of a register kept in Edinburgh has been published, which shows that during the 24 hours ending at 9 o'clock on Wednesday morning, the rainfall amounted to 1·58 inches. Most of it fell in the four hours ending at 10.30 on Tuesday night. The total for the 24 hours was equal to 36,000 gallons, or 160 tons, per acre. The rainfall for the whole year is still below the average. On Aug. 30, as measured at Glencorse, Edinburgh, it amounted to 17·15 inches, as compared with 23·10 inches in 1897, and 19·33 inches in 1896. At the Edinburgh Water Trusts' reservoir at Gladhouse, it has amounted this year to 16·22 inches, as compared with 21·92 inches in 1897, and 15·55 inches in 1896.

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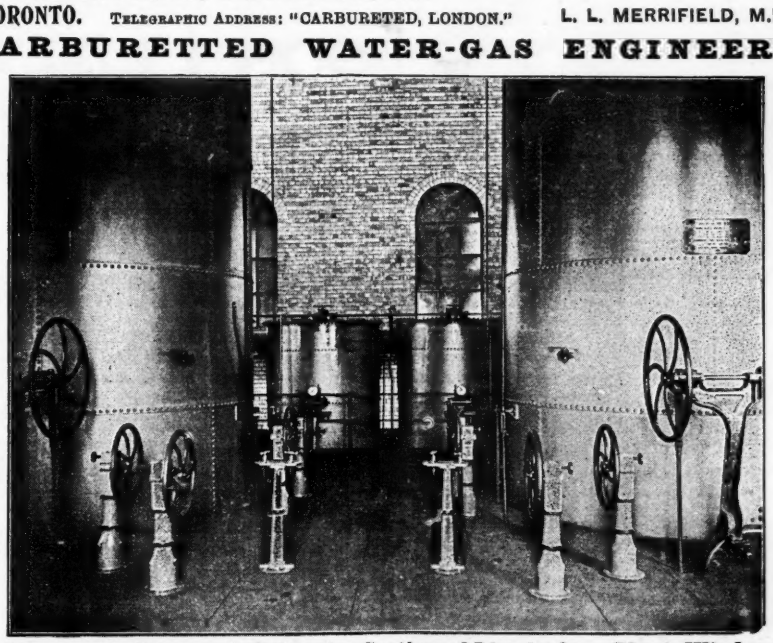


RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 3.

Sulphate of Ammonia.—August requirements being covered, dealers have ceased buying; and there has been some decline in values from the highest points touched. There has, however, been a satisfactory amount of direct demand; and all parcels continue to be picked up as they are put on the market. The closing quotations are £10 per ton f.o.b. Hull, and £10 2s. 6d. per ton f.o.b. Leith and Liverpool. In the forward position, no business of importance has transpired. The quotations are £9 17s. 6d. per ton f.o.b. Leith, ordinary terms, October-March delivery; and London, Beckton terms, £9 15s. per ton, October-December delivery.

Nitrate of Soda is firm in the forward position; but, owing to arrivals, spot price has declined to 7s. 6d. per cwt. for fine quality.

LONDON, *Sept.* 3.

Tar Products.—The continued low price of benzol attracts a good deal of attention, not only in this country, but on the Continent also. It is felt that gas manufacturers are not sufficiently alive to the economic value of benzol for enrichment purposes. The complaint that this enricher is condensed out of the gas in the mains shows that its application has been unwisely made. Benzol should not be added to gas already rich in it, as ordinary gas is supersaturated at ordinary temperatures with 3 per cent. To get the best results from benzol, it should be applied to poor gas; and at to-day's price, its cost will not be much more than one-third of a penny per candle power. There is still a fair demand for creosote and common tar oils; and stocks in makers' hands are somewhat lower than usual. For naphthalene there is good inquiry; and its use is said to be extending. Carbolic acid is firm. Cresylic or disinfecting acid is disappointing, having regard to the time of the year. Anthracene continues in a decidedly flat and unsaleable condition. On the other hand, a little more interest is shown in respect to pitch; and as the shipping season is now pretty near, this product may see some improvement, especially as the demand for German consumption is said to be enlarging considerably.

The average values for the week are: Tar, 13s. to 17s. Pitch, east coast, 24s.; west coast, 20s. Benzols, 90's and 50's, nominal, 9½d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 1½d. Crude, 30 per cent., naphtha, 4½d. Creosote, 2½d. Heavy oils, 42s. 6d. Carbolic acid, 60's, 2s. Naphthalene, pressed, 55s.; drained salts, 30s. Anthracene, nominal, "A," 4d.; "B," 3d.

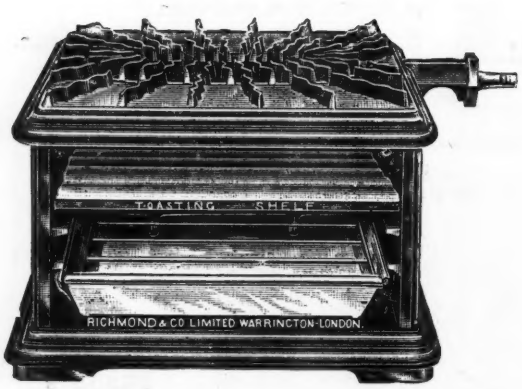
Sulphate of Ammonia.—Business is being done at prices ranging between £10 and £10 5s., less 3½ per cent.; the difference in price depending on port of shipment—Hull at the moment being the cheapest. For forward, buyers will not pay an advance; but with the present position of stocks, it looks as if sulphate must be dearer, especially as there is a firm tone in the nitrate trade.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The upward move in prices to which reference was made last week has now come into general operation throughout Lancashire. For the present, it is rather too early to ascertain at all precisely what effect the advanced prices may have upon business, as very much will depend upon the action of Yorkshire, and also whether some of the South-West Lancashire collieries will hold firmly to the full advance of which they have given notice. The position in isolated cases is perhaps not considered altogether strong, as may be judged from the fact that where it had previously been announced that round coals would be advanced 1s. per ton, the colliery owners at the last moment resolved not to advance more than 6d. So far as the Manchester district is concerned, the movement is general and definite, to the extent of 5d. per ton on best house-fire coals, 10d. per ton on lower house-fire qualities and other descriptions of round coal, and 5d. per ton on burgie and slack—the advance applying to pit, wharf, and delivered rates. In the South-West Lancashire districts, the upward move is somewhat irregular; many of the collieries not advancing round coals more than 6d., while others have sent out circulars raising their list rates 1s. per ton. With regard to engine fuel, there has been no general move in the above district, owing to prices having in most cases been put up a month or so back; and any advance at present is not more than a general levelling up of prices where they are below full current rates. The general pit quotations may be given at 11s. to 11s. 6d. per ton for best Wigan Arley; 10s. to 10s. 6d., for seconds Arley; 9s. up to 10s., for Pemberton four-feet; 7s. 6d. to 8s. 6d., for common round coal; with engine fuel ranging from 3s. 9d. and 4s. 3d. for the lower descriptions, to 4s. 9d. and 5s. 3d. for the best qualities. An extraordinary feature of the market is that, while prices for inland business have been very generally advanced on round coals with the commencement of the month, shipping rates have become easier owing to the termination of the South Wales dispute. Some of the collieries are well sold over the present month, at prices as high as 10s. 6d. per ton for good qualities of steam coal, delivered at the ports on the Mersey; but on any business now being put through, it would be difficult to get more than 9s. 6d. to 9s. 9d. for ordinary steam coal, delivered at the Garston Docks or the High Level, Liverpool.

Northern Coal Trade.—The coal trade has been weakened by the settlement of the Welsh difficulty, and the consequential increase of the output; so that the prices in this district are drooping towards a lower level. Steam coal is, of course, the most affected. Best Northumbrian steam has dropped to about 13s. per ton f.o.b.; second-class steam, to 12s.; and steam smalls, to about 7s. There is still a good demand for fuel, which must be expected to continue during the Baltic season; but it is possible that, for the winter deliveries, steam coals may be much lower in price. There is not the same change in the gas coal trade yet, because the demand is increasing, and because there is a considerable amount of coal to be delivered on old contracts. The price may be put as from 9s. 6d. to 9s. 9d. per ton f.o.b. Regarding the large gas coal contracts now under negotiation, counter offers have been made by



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GRILL PAN, GRID, and TOASTING-SHEET.

the companies; and it is possible that the tenders may be finally decided upon in the course of a few days. Gas coke is fairly steady at the prices that have been ruling of late.

Scotch Coal Trade.—Now that a settlement has been effected in South Wales, it is matter of certainty that there will not be, by-and-bye, so large an outflow of coal from Scotland. A drop in prices may therefore be expected, sooner or later. It is given out that there has been so much contracting forward month by month, that it will be several weeks before prices will be perceptibly affected. It would seem as if the settlement of the Welsh dispute had not been foreseen; otherwise the masters in the West of Scotland and in the Lothians would not have conceded the advance they did within the past two weeks. In Fifeshire, the masters have declined the advance; and the miners have, on the instruction of their leaders, lodged notices to cease work a fortnight hence. The men are being urged not to let the Welsh settlement influence them; but it is likely that it will, whether they care or not. The probability is that no strike will occur. The prices quoted are: Main, 10s. per ton f.o.b. Glasgow; ell, 11s. to 11s. 3d.; and splint, 10s. 9d. to 11s. The shipments for the week amounted to 253,972 tons—an increase of 11,070 tons upon the preceding week, and of 57,208 tons upon the corresponding week of last year. For the year to date, the total shipments have been 6,327,502 tons—an increase upon the same period of last year of 1,145,937 tons.

Protection of the Maidstone Water Supply.—In view of the outbreak of typhoid fever which occurred at Maidstone last September, and the Commissioners' report upon the matter, noticed in the "JOURNAL" last week and again to-day, the Directors of the Water Company have directed their Manager (Mr. W. J. Ware) to examine the springs daily. During the time the hop pickers are about, the springs will be under observation night and day, and all the sources of supply will be rigidly protected.

Dorking Water-Works Purchase.—Negotiations are proceeding between the Dorking District Council and the Water Company regarding the transfer of the undertaking of the latter to the former. Before calling a meeting of the shareholders to consider the expediency or otherwise of selling their property, the Directors determined to come to a definite understanding with the Council as to the basis on which they should conduct the negotiations; and, to that end, they submitted to them the following conditions: "First, that the transfer and price were to be made and determined in all respects as though an Act for compulsory transfer had been obtained. Second, that inasmuch as the sanction of the Local Government Board was requisite to the purchase the Council should either obtain that sanction before the arbitration, or would in the event of their not obtaining it repay to the Company the whole of the expenses incurred in connection with the agreement and the transfer proceedings." The Directors intimated that they were in favour of, and would recommend the sale, providing these terms were assented to; and last Thursday the Council unanimously agreed to them.

Reductions in Price.—The Directors of the Farnworth and Kearsley Gas Company have reduced the charge for gas 2d. per 1000 cubic feet; making the net price for public lighting and to consumers of more than 400,000 cubic feet per quarter, 2s. 6d., and for less than this quantity 2s. 10d. per 1000 cubic feet; the reduction to come into operation in the current quarter. The Stretford Gas Company will reduce the price of gas 3d. per 1000 cubic feet after the current quarter. The Westerham Gas Company have reduced the price of gas to 4s. 6d. per 1000 cubic feet.

The Falmouth Corporation and the Gas and Water Works.—The Falmouth Town Council have decided to employ Mr. A. Silverthorne to advise them in reference to the purchase of the gas and water undertakings. Mr. Silverthorne was consulted on a previous occasion when a similar proposal was under the consideration of the Corporation; and he then presented a long report upon the value of the works. In the course of the discussion upon his present appointment, it was said that further advice was now required, and that the ratepayers needed educating upon the subject. On the last occasion, it was explained, the Water Company refused to give Mr. Silverthorne facilities for obtaining information, and the report did not contain all that was necessary upon this branch of the subject.

Abercarn Water Supply.—Colonel J. T. Marsh, R.E., one of the Inspectors of the Local Government Board, recently held an inquiry at the Council Room of the Abercarn Urban District Council in regard to an application by them to borrow £8150 for increasing the water supply. Mr. T. S. Edwards, Clerk to the Council, represented that body; and among those present were the Surveyor (Mr. G. Stevens) and the Medical Officer of Health (Dr. Walter E. James). The Clerk stated that the population of the district was 13,500, and the assessable value £45,111; while there were outstanding loans at present amounting to £4674. Dr. James said the whole of the springs it was proposed to tap were practically deep seated, supplied very pure water, and were free from surface contamination. Mr. Stevens gave details of the proposed work, and the inquiry terminated. Subsequently the Inspector visited the springs.

Commemoration of the Passing of the New Act of the Gloucester Gas Company.—The passing of their new Act of Parliament was considered by the Directors of the Gloucester Gas Company an event of sufficient importance to justify a celebration; and it was carried out last Tuesday in a very generous manner—all connected with the Company, from the highest to the lowest, being invited to take part. The annual meeting of the shareholders was first held; and at its close those present were entertained to luncheon. The workmen, having been given a holiday, were later served, in a marquee at the works, with a substantial dinner, to which about 80 sat down—the Assistant Engineer (Mr. W. S. Morland) being in the chair. The families of the workmen were also included in the festivities—a capital meat tea being provided for them in the afternoon; and later on, to the strains of music, they indulged in various amusements. During the afternoon, several of the Directors and shareholders visited the works; and the hearty manner in which they were received showed that the utmost goodwill prevails between them and their workpeople.

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A Possible Source of Pollution for Liverpool Water.—The recent decision of the Chorlton and Manchester Joint Asylums Committee to utilize the Anderton Hall Estate (situate on the banks of the Lower Rivington Reservoir), caused the Liverpool Corporation to take fright at the prospect of the sewage from the projected asylum for 1000 patients percolating into the Liverpool water-works reservoir. A deputation from the Municipality has, in consequence, attended at the offices of the Local Government Board, and submitted their objections to the Board's Parliamentary Secretary; and seven local M.P.'s sent a joint letter to Mr. Chaplin. They pointed out that, however stringent the precautions might be to preserve the reservoir from contamination, there must always be danger. The selection of a site for a large asylum of pauper imbeciles in immediate contact with the water supply of a vast population was described as unfortunate. The President of the Board has already directed a public inquiry into the matter.

The Upper Derwent Water Scheme.—A conference recently took place between the Belper Rural District Council and members of both the North and South Darley Urban District Councils, at the Whitworth Institute, Darley Dale, on the subject of the great water scheme which is being promoted by the Corporations of Derby, Leicester, Nottingham, and Sheffield, to take the waters of the Upper Derwent for domestic supplies. Alderman Waite, of Duffield, attended from the Belper Rural District Council, who had written drawing attention to the scheme, and asking for the co-operation of the Darley Councils. There was a large attendance of the members of the Local Authorities. Alderman Waite pointed out that the boroughs had thoroughly determined to secure the Derwent waters for themselves. The object the Belper Council had in view was to consolidate the Rural and District Councils, so as to secure the water for the places in the county, before it was allowed to cross the boundary. There would be 14 million gallons per diem taken from Ashopton Valley, and this would be brought through the Darley Dale district. It would be easy to arrange to take water in bulk for the districts *en route*, at a very cheap rate. Moreover, it would be much better to secure this arrangement before the Bill was drafted, so as to save the expense of having to fight it in the Houses of Parliament. The proposal of the deputation was thoroughly supported by the Councils in conference; and it was arranged for them to join the movement to secure co-operation throughout the county. Committees from the two Councils will be elected later.

Repairing the Maes Gwyn (Shropshire) Reservoir.—The Bishop's Castle Corporation having applied to the Local Government Board for a loan of £1600 to defray the expenses of lining a reservoir at Maes Gwyn, in Shropshire, which developed such numerous leaks as to be useless for its purpose, Mr. Herbert H. Law, Assoc.M.Inst.C.E., one of the Board's Inspectors, attended at the Town Hall on Tuesday last to hold a public inquiry. The Mayor (Alderman Garnet-Botfield), the Chairman of the Water Committee (Alderman H. Greenhouse), and several of the councillors, were present. The Town Clerk (Mr. E. Griffith), in answer to the Inspector, stated that the loan was required to complete the reservoir at Maes Gwyn, which had a capacity of 2¼ million gallons. The population of the borough at the last census was 1586, which was a slight decrease from the previous census. The assessment was £4310 gross; and the loans outstanding were £4013. It was desired that the loan applied for should be spread over a period of not less than thirty years. The Borough Surveyor (Mr. J. Hamar) gave evidence as to the construction of the dam and the probable cause of the defects. Mr. E. S. Cobbold, Consulting Engineer to the Corporation, said the method he proposed to adopt in lining the reservoir was to use a layer of cement concrete 6 inches thick with a core of Callender's pure bitumen sheeting. He considered it hopeless to expect in such fissured strata a water-tight reservoir, unless it was lined throughout; and, after careful consideration, he had decided to adopt concrete with a bitumen core as being the most simple, economical, and efficient method of carrying out the work. Mr. W. T. Curry, the Engineer for the Contractors (Messrs. Callender), in reply to the Inspector, cited a number of cases in which their sheeting had been used with entire success. The method proposed for lining the Maes Gwyn reservoir—viz., by two thin layers of concrete with a core of bitumen sheeting—was the usual means of applying the material in open reservoirs of this class. There being no opposition, the Inspector closed the inquiry, and subsequently accompanied the Engineers, and some of the members of the Council, to view the reservoir.

There was recently held at Halifax an exhibition of "Electroid" acetylene gas, produced by Messrs. Marsh and Thorp's system. The gas is at present in use on one of the piers at Morecambe.

Messrs. Falk, Stadelmann, and Co., Limited, have issued a supplement to their general catalogue (Ed. 59) of lamps and fittings, incandescent gas lighting, electric accessories, acetylene lamps and burners, &c.

Messrs. Richmond and Co.'s very latest production in the way of advertising is a neat little card which puts a question relating to the culinary department of the household and gives the answer by pulling a string.

The Lamp Manufacturing Company, Limited, have brought out a new and effective illustrated catalogue of their several varieties of petroleum lamps; railway, street, and shop lamps for gas and oil; Coligny, Coligny-Welch, and Fullford regenerative gas-lamps; petroleum heating and cooking stoves, &c.

Messrs. C. Joyner and Co., Limited, of Birmingham, have decided to light with acetylene gas the large addition which they have recently made to their gas-fittings manufactory; and, after much experiment, they have placed the order for a "Thor-Scar" apparatus for the purpose with the Thornton-Scarth Automatic Lighting Syndicate, Limited.

Probably one of the largest orders ever placed in this country for conveyors, elevators, and appliances for the general transmission of power, has been given by the Directors of the United Alkali Company, Limited, to the New Conveyor Company, Limited, of Smethwick, for the new chemical works on the Manchester Ship Canal, to handle coal, coke, and phosphate rock. About 1000 feet of Mr. Gilbert Little's latest design of hot coke conveyor is to be supplied.

Messrs. Jenkins and Co., Limited, of Retford, have received further instructions from the South Metropolitan Gas Company to instal the duplicate plant of coal breaking, elevating, and conveying machinery for their Bankside works; this being a repeat order for this class of machinery as supplied last March for the same retort-house. The firm have also just received an order from the Portsea Island Gas Company for the erection of a mechanics' shop at their works.

The Altrincham Gas Company, as mentioned in the "JOURNAL" last week, have found it necessary to extend their carbonizing plant, and have decided to erect a new retort-house 64 feet span and 78 feet long, to contain six 20 feet through arches with settings of eight retorts on Chester's regenerative system. The contract for the whole of the work, including retort-house and coal-stores, chimney, retort-bench, and all fittings, &c., has been placed in the hands of Messrs. R. Dempster and Sons, Limited, of Elland.

The Airdrie Iron Company, the Managing Director of which is Mr. J. C. Adamson, one of the few remaining original members of the North British Association of Gas Managers, have just completed, at the Dawsholm station of the Glasgow Corporation, a set of condensers capable of dealing with 5 million cubic feet of gas per day. The completion of this contract makes a total condensing power of upwards of 26 million cubic feet per day, which the Airdrie Company have erected for the Corporation.

Messrs. Graham, Morton, and Co., Limited, gas engineers and contractors, of Leeds and London, have purchased the freehold premises, goodwill, &c., as a going concern, of the Hydraulic Seamless Pressing Company, Limited, Leeds, including the whole of the land, four large workshops, 100 feet long and 45 feet wide, fitted with overhead travelling cranes, &c., and the entire plant and machinery, which comprises the most modern system of electric welding. The works are fitted up with the electric light; and there are spacious erecting-shops and yards convenient to the plating-shop. We learn from the Managing-Director (Mr. Maurice Graham) that the Company will run this stamping and pressing business in conjunction with their own manufacture of elevating and conveying machinery for handling all classes of material, and their improved system of inclined retorts, as personally erected by Mr. Graham in many gas and chemical works at home and abroad. The Company have also acquired the whole of the valuable patent rights in connection with this improved system of flanging and pressing. They have now, therefore, an extended sphere of operations; and the present management should be a guarantee that the business will be efficiently conducted.

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Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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[For Illustrated Advertisement, see p. 553.]

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For List of Principal Contents, see Advt. last week, p. 503.

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JAS. J. WILSON, Secretary.

Gas-Works, Carluke, Scotland, Aug. 30, 1898.

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GAS PURIFICATION BY HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

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Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
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GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

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Ash	2·04	Ash.

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Illuminating Power . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 "
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Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

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Yield of Gas per ton . . . . . 10,500 cub. ft.
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Coke . . . . . 73·1 per cent.

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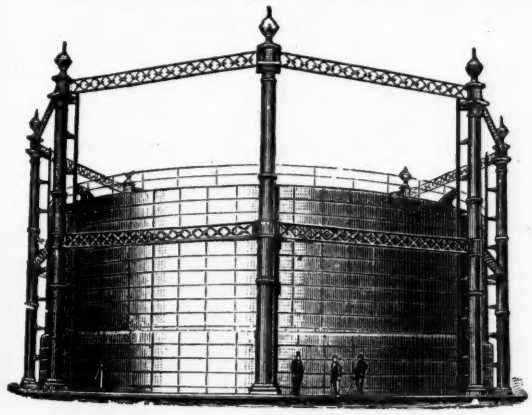

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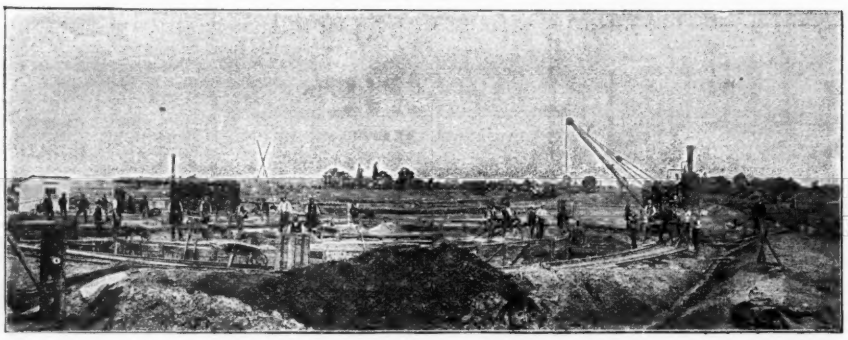

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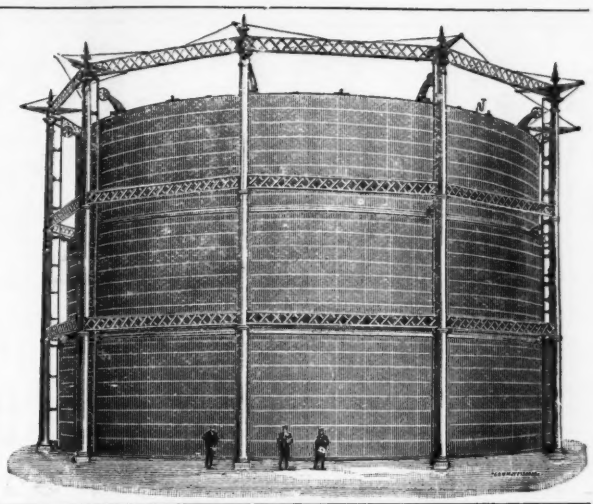

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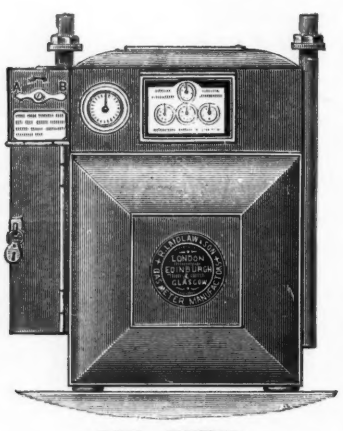

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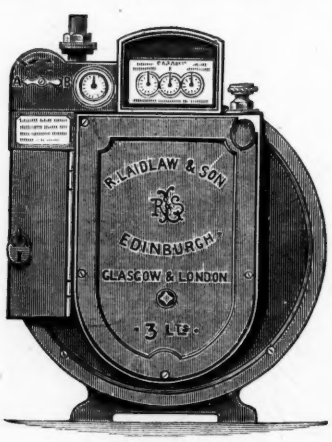

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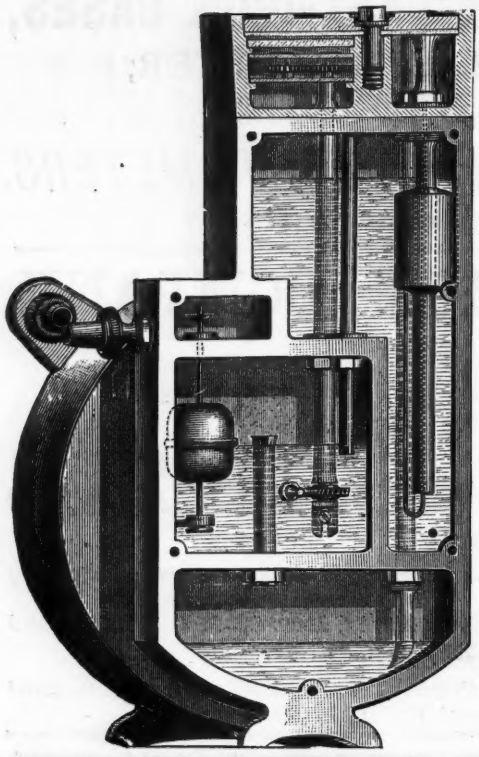

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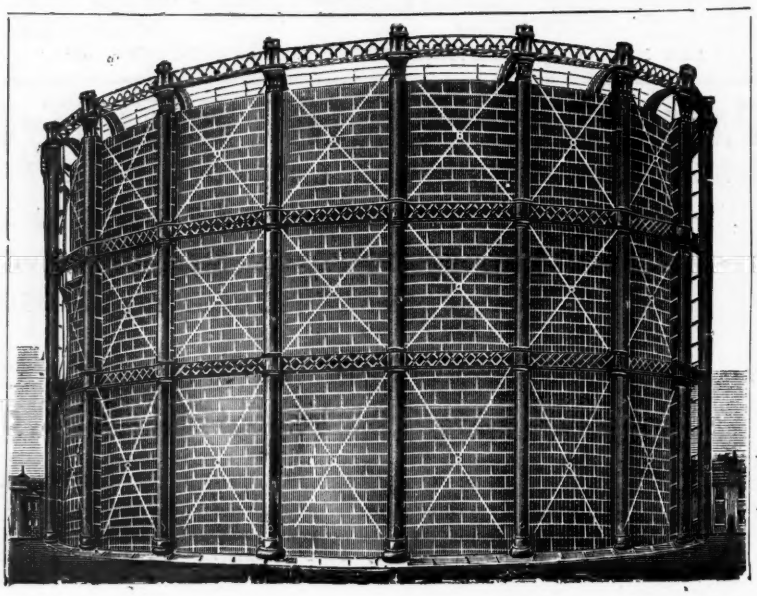

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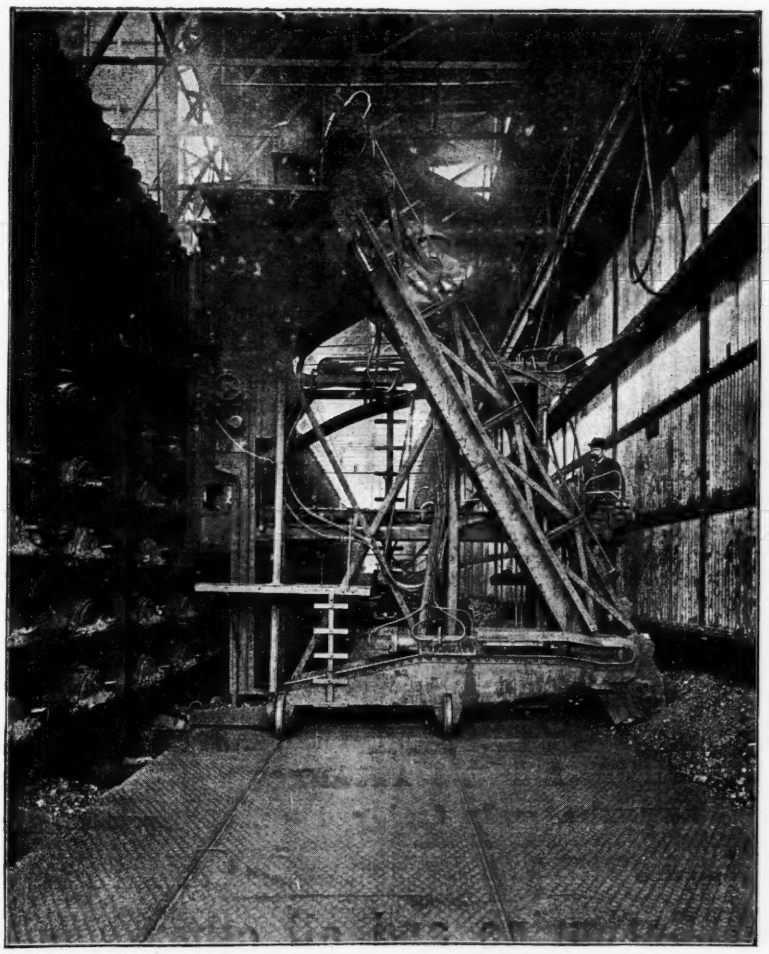

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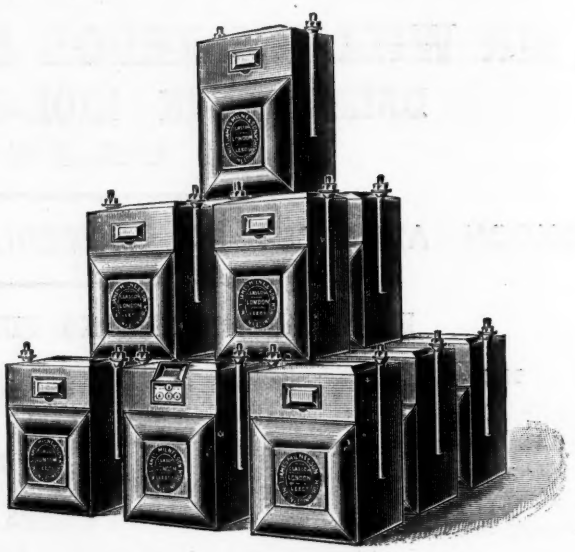

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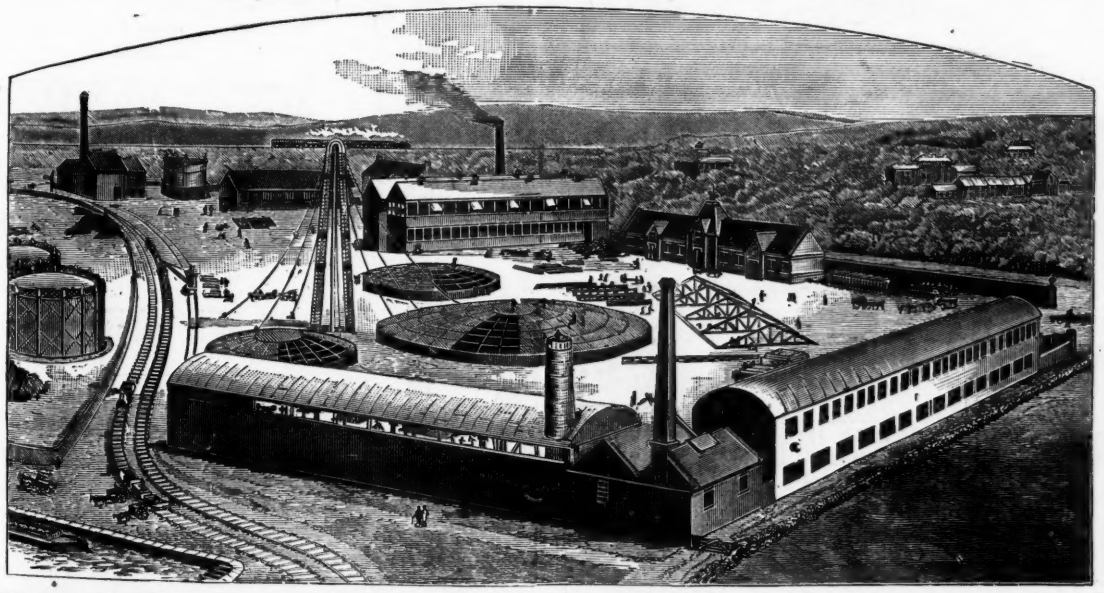

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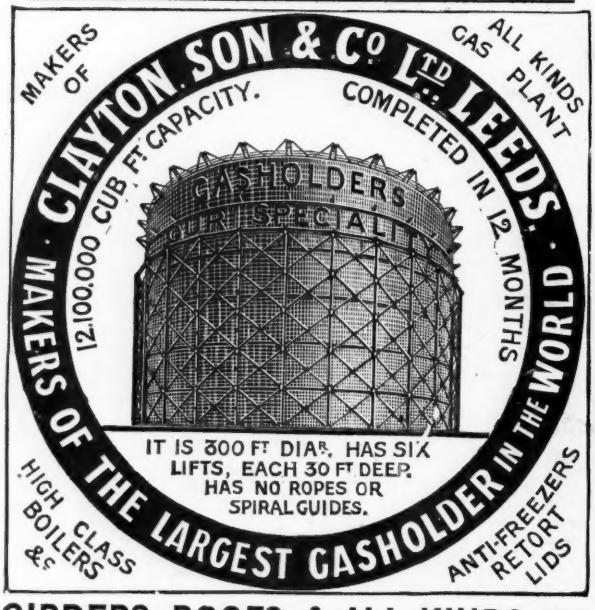
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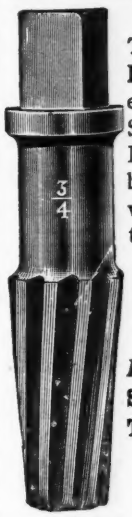

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[See also Advt. p. 524.

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